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THE

LIVERPOOL

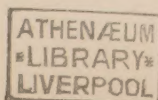# MEDICAL & SURGICAL REPORTS.

OCTOBER, MDCCCLXVII.

EDITED BY

F. T. ROBERTS, M.B., B. Sc., Lond.,

AND

REGINALD HARRISON, F.R.C.S.

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PREFACE.

THIS Volume has been undertaken with the object of presenting to the Profession a series of articles of a practical nature, founded, for the most part, on the experience that is afforded by the public Medical and Surgical Charities of Liverpool, which, in size and importance, are well proportioned to a town containing upwards of half a million inhabitants.

This, the first annual number, embraces contributions from Medical Officers connected with the Royal Infirmary and its School of Medicine, the Northern, Eye, and Fever Hospitals, and the Ladies' Charity; but it is hoped that future volumes will be further enriched by others having similar fields for observation and research.

All the papers have been corrected for the press by their respective authors, a task which has materially lightened the Editorial duties.

The great success that has attended the publication of Reports in connection with some of the London Hospitals, induces us to hope that these endeavours to promote and foster clinical enquiry will not be unappreciated by our professional brethren.

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LIVERPOOL, *October*, 1867.

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LIVERPOOL
MEDICAL AND SURGICAL REPORTS.

CASES OF PARALYSIS,

WITH CLINICAL OBSERVATIONS,

By JAMES TURNBULL, M.D.,

PHYSICIAN TO THE LIVERPOOL ROYAL INFIRMARY.

CASE 1.—*Hemiplegia, with muscular rigidity and pain following Epileptiform Convulsions.—Treatment by leeches and counter-irritation, by Bromide of Potassium and Galvanism.—Perfect recovery.—Observations.*

ELIZABETH SPENCER, a healthy-looking woman, a cook, aged 26, was admitted into the Infirmary on the 22nd of November, 1866, with paralysis of the left side. She stated that her illness began two months before admission, with fits. She was seized with the fits without warning, sometimes at night, and as often as three times in a day. She became unconscious during them, but had never bit her tongue or injured herself. The left side only had been affected by the convulsive attacks. From the commencement of the fits, the left side became weak, and this gradually increased till it was completely paralysed and useless.

On admission, there was complete loss of power of the left side, and the arm was rigid and painful, and the pain was increased by extension. The speech was affected, and the vision of the right eye impaired. There was pain in the head and febrile disturbance, the tongue was furred, and she complained urgently of want of sleep.

Nine leeches were applied to the head and gave great relief, and she was freely purged with compound jalap powder. As she did not sleep, she took a draught containing 15 grains of bromide of potassium, at six o'clock in the evening, and again at nine, which

seemed to have the effect of causing sleep.   She was subsequently
blistered at the nape of the neck.   By these means the pain in the
head and the painful rigidity in the arm were completely removed,
but she scarcely regained any power in the arm or the leg.   On the
31st December she had recovered, so far as to be able to be set on a
chair by the side of the fire, and she then said that she felt quite
well in health, but had no use of the arm or leg.   They were in
fact quite powerless.   Galvanism was applied the following day, and
very soon produced a marked beneficial effect on both the arm and
the leg.   In a fortnight she was able to make some use of the arm,
and could walk dragging the foot.   She continued to regain strength
and power under this treatment, and on the 4th of February she
was discharged, being quite well.

Observations.—This case was the subject of some clinical
remarks at the time it occurred.   It was then observed that it pre-
sented many points of interest, in regard both to the symptoms
which were well marked, and also in regard to the treatment which
was carried out, with the two definite objects, of first removing
inflammatory action in the brain and membranes, and of afterwards
rousing the lost or suspended power of motion.   The diagnosis as
to the part of the brain affected, and the exact nature of the
diseased action, is often obscure in such cases.   The history was
different from that of ordinary cases of hemiplegia from san-
guineous apoplexy or cerebral softening, the loss of power having
commenced with epileptiform convulsions.   It is well known that
epileptic fits are not unfrequently followed by attacks of paralysis,
which are generally of a temporary nature, and seldom last more
than a few days.   Such attacks of temporary paralysis are usually
the effects of the congestion produced by the fits, which, Trousseau
tells us, will sometimes cause spots of ecchymosis on the face, and
also a similar effect on the brain and its membranes, and even
effusion of blood into its substance.   The connection between
hemiplegia and epilepsy has also been illustrated by Dr. Todd, in
one of his lectures on what he has termed epileptic hemiplegia.
As, however, there was no evidence of epilepsy in this case previous
to the patient's illness, I looked on the fits not as the cause, but a
symptom, of an affection of the brain.   From the pain and rigidity

in the paralysed arm, the pain in the head and the febrile disturbance, it was inferred that there was inflammation of the brain and membranes of the right hemisphere, and that it had extended to or involved the central parts, the corpora striata or optic thalami; and that there might be a clot which had set up the irritation. The effect of local depletion and counter-irritation in removing pain and rigidity seems to show that there must have been inflammatory action, but we have no certain means of knowing whether it was caused by a clot or not. The gradual accession of the palsy, and the completeness of recovery, would rather tend to show that there was no such complication.

For about five weeks after the symptoms of irritation of the brain had been removed, the patient was kept quiet in bed, with light nourishment, the object being to promote nature's efforts to repair local mischief by absorption whether of effused blood, or of the products of inflammation. Having allowed sufficient time for this purpose, galvanism was employed with the view of giving a local stimulus to the paralysed parts. I have seen galvanism of use in some local forms of paralysis, but I have not seen much advantage from its application in hemiplegia, or paralysis dependent on cerebral disease. In this case, however, it acted well, and so speedily, that it seemed to draw out a latent power; and within a month from the time it was first applied, she had completely regained the use of all the paralysed parts.

In the early stage of the case the bromide of potassium was employed to procure sleep. This remedy has a powerful sedative influence on the nervous system, which medical men have lately become more fully aware of. It was used only at first, for a few days, to promote sleep, and it seemed to produce this effect.

CASE 2. — *Paraplegia, with complete loss of power of the lower extremities, impaired sensation, and sloughing over the sacrum. Slow recovery, with sustaining tonic treatment and cod-liver oil.*

ROBERT BOAG, a sailor, 21 years of age, of healthy but not robust appearance, was admitted into the Infirmary on the 21st of December, 1866, with complete loss of power of both legs. He could

not move them at all, and the sensation in the feet and legs was also impaired. The power over the bladder was also diminished, so that he could not completely retain the urine. A large slough of quite six inches in diameter formed over the sacrum, completely exposing it, and causing a long continued profuse discharge. When admitted, he had only been ill for a week, but though he was closely questioned, no satisfactory explanation of the cause of his illness could be obtained. He had not met with any injury, and there was no tenderness or any sign of disease of any part of the spinal column, but the disease had speedily reached the condition of complete palsy of both legs and the lower part of the body. It seemed probable that the complete interruption of the nervous influence from the brain must have arisen from extravasation into or upon the cord, or some organic change in its substance, and as the prostration of the patient precluded any active interference, the treatment consisted in attending to the secretions, placing the patient on a water bed, and giving him stimulants, quinine, and nutritious food. He had a good appetite and digestion, but when he had been three months in hospital he had become very weak and emaciated, and his condition appeared altogether very hopeless. The large sore, however, on the sacrum was contracting. Cod-liver oil was then given, and a gradual improvement followed. He gained flesh and strength, and began to draw attention to his power of moving, first his toes, and afterwards his legs. He went on steadily improving, the sore contracting, and the power in the legs increasing, till he was able to get up and walk with two sticks.

On the 15th of May, 1867, he was sufficiently well to be discharged.

On the 1st of July he came again to the Infirmary to show himself. He had then acquired a healthy appearance, and though there was still some weakness in the legs, he had crossed the river from Cheshire, and had, with the aid of one stick, walked between three and four miles. The sore on the sacrum was nearly, but not quite, healed.

Observations.—We cannot suppose that in this case the loss of power arose from reflex action. There must have been some lesion of the cord itself, or pressure upon it, interrupting the nervous

current, and the case is interesting, as showing the amount of reparation which is possible in paraplegia of the most severe kind. The treatment was essentially sustaining and tonic, with the view of aiding Nature's efforts to repair any lesion of the cord, and to heal the large sore on the sacrum. Cod-liver oil was given for this purpose, and produced such a decided effect that a curative influence may be ascribed to it, and it is a remedy from which I have seen signal benefit in some other cases of this disease.

The two following cases illustrate the effects of syphilis on the nervous system in causing, in the first, paralysis of motion; and in the second, numbness and loss of sensation, with slight loss of motary power.

CASE 3.—*Paraplegia, with syphilitic eruption.*—*Treatment by Mercury and Iodide of Potassium.*—*Partial recovery.*

JAMES MURDOCK, a sailor, aged 28, was admitted into the Infirmary on the 9th of April, 1867. He had suffered from primary syphilis five months previous, and an eruption came on his back and face about a month after. For this he was treated with baths of calomel fumigation, and he then went to Scotland for change of air. This was ten weeks before admission. He was well when he got into the train, but when he reached the station he was unable to walk or stand, having lost the power of his legs without feeling any pain.

On admission, there was a tuberculous eruption on the face, more particularly the right side of the forehead, and there were also some marks of the first eruption, which had not been entirely removed by the mercurial fumigation. His legs were so paralysed that he could scarcely use them. They shook and trembled under him, and he could only walk a few steps with the aid of a stick and of some one holding him. There was no pain anywhere, and no loss of sensation in the legs and feet.

He was brought under the influence of mercury by means of small doses of blue pill with opium, and the use of iodide of potassium was afterwards conjoined with it. Under this treatment he improved, and gained more power in the legs. On the 27th of May the eruption was entirely removed from the face, and

his legs were stronger, but he had still to use two sticks in walking. From this time the mercurial treatment was laid aside, and he took the iodide of potassium only. Though galvanism was afterwards used, he did not, from this time till the 25th of June, when he was discharged at his own request, make much further progress.

Case 4.—*Numbness and loss of sensation in fingers and toes, with some muscular weakness.—Syphilitic Rupia.—Treatment by Mercury and Iodide of Potassium.—Perfect recovery.*

Alfred Wynn, an iron moulder, aged 35, was admitted into the Infirmary on the 17th of June, 1867, on account of numbness of the ends of the fingers of both hands and the toes of both feet. He stated that he had been in the Infirmary five years before, when he had been similarly and more severely affected. He had suffered from syphilis thirteen years previous, and on admission he had spots of syphilitic rupia on the head, back and legs. The fingers were numb and dead, so that he could not feel when they were pinched. He was also unable to lay hold of and pick up small objects. The loss of feeling had begun three months before, and was increasing. On the former occasion there had been greater loss of muscular power in both the hands and the feet, which had been entirely removed by treatment. He was treated by mercury, and the gums were kept slightly under its influence till the numbness and want of sensation were entirely removed. Iodide of potassium was also given, and continued after the eruption had disappeared. On the 25th of July he had no feeling of numbness, and the eruption was entirely removed.

Observations.—The affections of the brain and spinal cord, which are produced by the syphilitic poison, are, as a general rule, more under the influence of treatment than other forms of paralysis. In the case, however, of Murdock, though mercury and iodide of potassium were both fairly tried, the improvement up to the time of the patient's discharge was not as great as might have been expected in a case of paraplegia due entirely to this cause; and it is worthy of observation that the loss of power came on quite suddenly, while he was travelling in a railway carriage.

The loss of power in the nerves of sensation, which was the prominent symptom in Wynn's case, is a more rare effect of syphilis. That it was due to this cause there could not be any doubt, and the recovery of the patient under similar treatment on both occasions confirmed this view of the nature of the case. In most cases where there is loss of motary or sensitive power from cerebral disease, one side only is affected, but in this case not only both hands but also both feet were affected; and in this action of the syphilitic poison we see an effect analogous to that of lead poison, which generally acts on both sides, and often paralyses the extensor muscles of the feet as well as those of the hands.

The most extensive paralysis which has ever come under my observation occurred in a gentleman, who was covered with a syphilitic eruption. It began with paraplegic weakness of the legs, which in a few days extended upwards, till the whole body, except the neck, head, and face, was affected. He was perfectly helpless, unable to raise his hands to his head, and even the respiration was somewhat impeded. With some difficulty he was brought under the influence of mercury. The eruption then began to fade, and there was a gradual return of power, first in the arms, and more slowly in the legs. He ultimately regained the power of walking, though he had always some paraplegic weakness afterwards.

In what way does syphilis affect the brain and the spinal cord in these cases? It appears to do so in most cases indirectly, and the *dura mater* may be thickened, as the external periosteum is when nodes are formed, and the disease may thus extend to the membranes and the surface of the brain itself. The arterial coats are sometimes affected by the poison, and in this way, as well as by its direct action on the brain, the nutrition of the organ may be injured. Professor Jaksch has stated that, in twelve fatal cases of syphilitic paralysis, the pathological appearances in the brain were— in six instances softening in the cerebrum (sometimes with and sometimes without gummy tumours), in one case softening of the cerebellum, in three cases abscess of the brain, and in two atrophy of the white substance.

INJURIES OF THE TRACHEA,

WITH REMARKS, BY JAMES LONG, F.R.C.S.,

CONSULTING SURGEON TO THE ROYAL INFIRMARY.

(Case reported by Mr. CHAUNCY PUZEY, House Surgeon, Royal Infirmary.)

————

WILLIAM TURNBULL, a spare but healthy-looking lad, aged 6, was admitted into the Liverpool Royal Infirmary, on August 27th, 1865, under the care of Mr. Long.

He had just fallen out of a second floor window, into a court, striking his throat against the leg of a table (lying upside down), with such force as to break the leg from the table.

On admission, he was in a semi-collapsed state. Below the chin was a lacerated wound, about three inches long, communicating with the interior of the mouth. Just below the cricoid cartilage was a bruised spot; the whole of the neck and upper part of the chest were emphysematous, so that by examination the state of the parts underneath could not be ascertained. The voice was indistinct and husky, the respiration croupy; on listening to the respiration, crepitation was heard in every part of the chest, especially over the bifurcation of the trachea and larger bronchi, arising probably from emphysema of the cellular tissues of the mediastrum and lungs.

Soon after admission the boy vomited, the face became puffy and livid, and the emphysema quickly extended to the umbilicus.

Four hours after admission, Mr. Long, who had been sent for, made a free incision from the wound below the chin, to a point a little above the sternum, air was seen bubbling up from the centre of the wound at each expiration, and after a little dissection a hole was seen in the trachea, just below the cricoid cartilage; into this a tube was speedily introduced, the state of the boy forbidding any minute examination of the parts.

The boy was put on a milk diet, with occasional stimulants as required, and kept in a luke-warm atmosphere, of uniform temperature. This is easily arranged by placing over the upper half of the body a cover like the top of a covered cart, placing a kettle on the fire with a vulcanized india rubber tube attached to the spout, the end of the tube being placed under the cover, the steam is allowed to escape, and the temperature regulated by a thermometer placed under the cover—a most valuable means of treating inflammatory affections, and injuries about the throat. He passed a good night, next morning the tube was removed, but after a few hours the respiration became so difficult that it was reintroduced.

Slight symptoms of pneumonia now occurred, but soon passed off; on the fifth day the tube was accidentally removed by the nurse, and the boy breathed well without it for thirty-six hours, but as soon as the opening began to close, dyspnœa occurred, and it was again inserted. While the tube was out the first ring of the trachea could be distinctly seen, divided vertically, as if cut with a knife.

The boy now improved in every respect, except that dyspnœa became urgent the instant the tube was removed. The tube being placed high up in the neck, its position being awkward and keeping the larynx backwards, it was thought probable advantage might accrue by placing it lower down in the trachea. This was done on the 20th of September; a fresh incision being made, it was placed about an inch lower down. No advantage arose from this proceeding; whenever the tube was removed, the dyspnœa came on as quickly and as urgently as before. He left the Hospital for a time on the 12th of November, but presented himself for examination several times during the year 1866, but whenever the tube was removed, and the aperture in the neck closed by the finger, dyspnœa became as urgent as before.

Continued by Mr. Long.—Mr. Pusey having directed my attention to the two cases of successful division of the larynx by Mr. Arthur E. Durham, in Guy's Hospital Reports, vol. 12, p. 540, I, with the concurrence and assistance of my colleagues at the Hospital, Messrs. Stubbs and Bickersteth, performed this operation on the 29th of January, 1867, i. e., about seventeen

months after the accident.   This was done under chloroform. The integuments having been divided, a curved probe-pointed bistoury was passed into the opening in the trachea, and the cricoid and thyroid cartilages divided exactly in the median line.   The operation was attended with considerable difficulty, in consequence of hæmorrhage, which was arrested by the ligature of a few small vessels; but the great difficulty arose in the administration of the chloroform, which had to be given through the opening, and also from vomiting occurring during its administration.

When the tube was removed, a large fungous granulation, having much the appearance of a polypus, protruded into the opening; it was seized with the forceps and snipped off; the sides of the thyroid cartilage being held apart, an excrescence of a granular form, the size of a split pea, was seen adhering to the right true chorda vocalis ; this was also snipped off.   Though, doubtless, these growths would to a certain extent impede the passage of the air through the larynx, still I feel sure they were not the sole, or principal cause.   I found considerable difficulty in introducing the bistoury upwards through the tracheal opening, the upper part of the trachea shelved downwards, the opening behind being merely a transverse slit.   I think, therefore, that the passage of the air through the larynx, when the tube was withdrawn and the external opening closed, was impeded mainly by the parts above this opening being contracted and sloping backwards, owing to the pressure of the convex surface of the tracheal tube.   After the operation no sutures were used, and no tube introduced, the parts being allowed to fall together by their own elasticity, and adapt themselves according to their own fashion. The patient was put to bed, and the warm-water apparatus used as before.   Nothing worthy of note occurred till February 1st, the third day after the operation.   Early in the morning the respiration was difficult, large quantities of semi-purulent matter were coughed up, and evacuated both by the wound and mouth.   Mucous râles existed on the left side ; dyspnœa became urgent, and the tracheal tube was introduced.   On the following day, the respiration being more easy, the tube was removed ; from this date he improved rapidly, the wound began to close up, each day more air passed through the larynx and less through the wound, and in ten days

from this date it was noted that, when asleep, the air passed almost entirely through the larynx.

I examined him carefully on the 17th of July. When sitting still, the respiration was perfectly natural; no one would be aware that anything had been the matter with him. When excited, as by running, the air could be heard (at the distance of several yards) passing through the larynx, and producing a rough blowing sound. The same was heard in a less degree when he was quiet, by the application of the stethoscope to the larynx. His voice was quite distinct and toned, but of the character of that of a boy of 14 or 15, when the voice is beginning to break. The skin of the neck was depressed, and slightly adherent to the trachea beneath, but to a certain extent moveable, and obviously loosening. No irregularity could be felt on the larynx or trachea. He enjoyed excellent health, and ran about the streets; his mother said he was a very bad boy, was constantly getting wet, particularly about his feet, but he did not suffer more than other boys from this. He had sometimes, she said, a cough and a bit of cold, but no more than could be expected. I cannot conclude this case without stating that the successful termination of it was mainly due to the constant attention and skill by which it was managed throughout by Mr. Puzey.

In the *Medical Times and Gazette*, New Series, vol. 13, I have recorded a case of Rupture of the Trachea. It is also mentioned in Holmes's *System of Surgery*, vol. 2, p. 286. The outline of the case is as follows :—

A railway labourer, aged 20, whilst connecting two railway carriages, was caught round the neck by the coupling irons. The skin was merely abraded.

The accident occurred on the 24th of October, 1855. It is probable the trachea was not completely torn across at the time of the accident, but that five days afterwards the separation was complete, the lower end of the trachea being on a level with the upper border of the sternum, the larynx, with a small portion of the trachea attached, above. I saw the man on the 26th of June of the following year, and, after describing his state, remarked,— "I presume, therefore, that a fibrous tube has been developed between the upper and lower ends of the divided trachea." I am

induced to draw attention thus briefly to the above case, having accidentally met with the man on the platform of the St. Helens Railway on the 27th of September, 1866, nearly eleven years after the accident.

He accosted me (but I had no recollection of him) and told me who he was. The tone of his voice was perfectly natural. He said he was in excellent health, and so he appeared; that he was now a clog-maker, and experienced no ill-effects from his accident; that he was not liable to chest or throat affections. As the train was coming up, and I had little time to spare, I then and there, after he had removed his neckcloth, examined his throat. The larynx, with its small portion of trachea attached, was felt and seen as before at the upper part of the neck, but nothing below. The sterno cleido muscles projected prominently on both sides, but the fibrous tube whereby I had supposed Nature had intended to remedy the accident was gone. When he expired, the integuments between the sterno cleidi were thrown out, so as to form an all but plane surface between them; when he inspired, they sank down, forming a complete gutter from the larynx to the sternum. I could easily, by pressing my finger, feel the spine, but could not detect, either by feeling or sight, any defined lateral boundaries.

On the 11th of July, 1848, a trachea was brought to me by Mr. Stewart, of Messrs. Stewart and Hill, Surgeons, Great Howard Street, Liverpool, with a request from the coroner that I would examine it, and also the body of the woman from whom it was taken, as there were circumstances of a very suspicious nature connected with the case. The circumstances were briefly as follows:—

A sailor paid his addresses to a female, took her to chapel for the purpose of marrying her, but was too late, so the ceremony was not performed. He took her to his lodgings. On his way thither he met a friend, who was somewhat intoxicated. The intended bridegroom was in the same state. At night he went to bed with the woman. His friend sat, or lay, all night at the foot of the bed. About four o'clock in the morning both of them came down stairs. One went to the privy, the other to purchase some rum, saying to the mistress of the house that the female upstairs

was ill. They both shortly went again upstairs, and some little
time afterwards summoned the mistress. She went upstairs, but
did not see the woman, as her face was covered up. She sent
immediately for Mr. Stewart. He arrived at half-past eight a.m.,
and found the woman dead. This occurred on the 9th of July.
Mr. Stewart was told that the deceased had been seized with
vomiting and purging, but he saw nothing to indicate the one
or the other. The mistress of the house stated very indefinitely
before the coroner that she had seen something of the kind.
Mr. Stewart knew nothing of the previous history of the case, and
had no suspicion that there had been foul play. He found her
lying on her back, extremities cold, and body getting cold, rigidity
commencing, the arms extended at her sides, face natural, no
protrusion of the tongue, in fact, nothing to attract particular
notice. He concluded she had been dead about two hours. Some
rumours having got abroad, Messrs. Stewart and Hill were requested
by the coroner to make a *post-mortem* examination. This was
done on the 11th, about fifty-eight hours after death. There
was no discoloration of the neck, but the neck was swollen, par-
ticularly on the right side, and when pressed upon produced the
crepitating feel of emphysema; this extended down to the back,
shoulders, and chest of the same side. On making an incision in
the mesial line, no extravasation of blood was found amongst the
soft parts; on pushing the muscles aside with the handle of the
scalpel, a small clot of blood the size of a fourpenny-bit was seen
on the right side of the trachea; around this clot was a slight
effusion of fluid blood, and the cellular tissue was softer and more
easily broken up than elsewhere. On removing the clot an opening
into the trachea was found directly under it. On further examina-
tion, another opening into the trachea was found, rather more in
front. The larynx and trachea were then removed. A considerable
amount of frothy fluid was found in the trachea. The lungs were
distended with air, but did not protrude when the thorax was
opened; they were much congested posteriorly; the right side of
the heart was distended with blood, partly fluid, partly coagulated;
the left side was also filled with blood, but not distended. The

above is a summary of the evidence given by Mr. Stewart before the coroner.

On the afternoon of the 11th I went down to inspect the body, which had been opened in the morning. The day was excessively hot, decomposition was rapidly advancing, so that I could add nothing to Mr. Stewart's statement, except that we opened the head and found nothing worthy of remark. I also examined the stomach, which had been removed by Mr. Stewart and put into vinegar and water: it contained about a tablespoonful of a san- guineous fluid having no particular odour. There was nothing else to be noticed.

On the following day I carefully examined the trachea. It had been in spirit and water all night. I found the second ring on the right side broken, with absence of a small portion of the ring, thus leaving an opening about four lines long and three wide. The third and fourth rings were broken through perpendicularly near their centres; three or four rings below these were cracked, but not broken through; the fractured rings presented a clean, not a jagged surface; the mucous membrane had, however, a jagged appearance, as if torn; it was of a dark port wine colour, being deepest at the injured parts, and fading gradually in colour as it was more distant from them. The trachea at the injured part resisted pressure when made directly in front, but when the pressure was made obliquely at both sides at once, by the finger and thumb, it gave way, and the parts overlapped each other, pro- ducing the impression that the injury had been inflicted by pressure in the direction above indicated. I discovered two slight cuts made by the scalpel in cleaning the larynx, on the forepart of the cricoid cartilage, and a small piece sliced off it on the left side close to the thyroid cartilage. Mr. Stewart informed me he had found, on clearing the soft parts adhering to them, a small bit of cartilage corresponding to the aperture in the first ring.

I tried on the body of a female of about the same age, 26, recently dead, to break the trachea, by making pressure with my thumbs obliquely at the sides of the neck and on the trachea, having my fingers behind the neck. I used all the force I could

exert, and got an assistant to place his thumbs on mine to increase the pressure. On dissection, I found the trachea uninjured.

I tried to fracture the tracheal rings of a lamb (just removed from the body), by forcible compression between the thumbs, but did not succeed; but fractured easily those of a sheep by the same proceeding. The rings did not all break at the same line, but irregularly, the fractured ends, however, were quite smooth, as if cut.

In my evidence before the coroner, I gave it as my opinion, in which Messrs. Stewart and Hill coincided,—that the woman had been strangulated, most probably by the hands being placed behind the neck, and the thumb applied at the sides of the trachea; and that, to produce the appearances found in the *post-mortem* examination, the cause could not have occurred after death, the antagonistic action of the air suddenly confined in the trachea being necessary for this purpose; that the appearances could not well be produced by the surgeon in removing the trachea, for the incisions were not near the parts injured; that the clot was seen, and the opening in the second ring found, before the trachea was removed; that the parts were cleaned as much as possible with the handle of the scalpel, and that Mr. Stewart was sure the cuts were made on cleaning the trachea after its removal from the body. I directed attention to the lacerated mucous membrane presenting the appearance of being torn by a force operating from within, viz., by the expulsive effort of expiration. I also pointed to the blood staining at the injured parts. The coroner committed the intended bridegroom for trial on the charge of murder; the grand jury discharged the case, so far as I could understand on the following grounds: 1.—There was no direct evidence, supposing the woman had been murdered, that either or which of the individuals in question had done it. 2.—The rupture of the trachea might have taken place during the act of vomiting. (There was no evidence that she did vomit.) 3.—It might have occurred after death, by the neck falling upon the edge of the coffin. 4.—That the surgeon might have produced the appearances I have described by his careless removal of the parts.

It is probable, various opinions may be formed on this case, but

at this distance of time, nearly twenty years, I feel assured the woman met with a forcible death.   I do not say she was intentionally murdered, but forcible compression may have been made on the trachea to prevent her cries, and the trachea ruptured by forcible compression on the one side, and attempts at expiration on the other.

In the *Medico-Chirurgical Review*, No. 75, p. 275, I find " Fractures of the Larynx and Rupture of the Trachea " (*American Journal Medical Science*, April,) relates a case in a man 45 years of age, and refers to twenty-nine other cases.— These I have not had an opportunity of referring to.

ON CROUP.

By THOMAS INMAN, M.D., Lond.

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WHEN Agassiz and other natural philosophers measured the rate of progress in various glacier streams, they established on the rocky banks some conspicuous mark, which was certain to remain immovable, whilst on the stream itself they placed a line of posts, which, being inserted into the ice, would travel with it. By this means they could not only calculate the average rapidity of flow, but the relative movement of the various parts of the current. As a result of their investigations they found that the progress of glaciers was variable, being sometimes comparatively rapid, and at other times almost arrested altogether.

Now there can be no doubt that the progress of medicine resembles much the forward progress of an icy stream. If we fix our landmark at the time of Hippocrates, and examine how far the stream of therapeutics has advanced since then, we are astonished at the smallness of the onward march. But though the stream for many ages appeared to be congealed, and its flow almost as imperceptible as that of a glacier in a hard winter, yet the summer has come round at last, and the movement of the stream is unusually rapid. The cold chills produced by deference to 'authority' have given place to the genial sun of thoughtful reason.

In nothing is the movement in the therapeutical glacier more conspicuous than in the treatment of croup. To demonstrate this, let us take a survey of the ancient marks. Thirty years ago the disease in question was considered as one of the most formidable to which our children were subjected, and in direct proportion to the fears which it excited was the activity of the doctor to counteract the complaint. As a student he had been taught to recognise

the disease by its symptoms, and when once the formidable enemy was identified, he was instructed to attack it with antimonial emetics, with local bleeding by leeches or by opening the external jugular vein, by blisters or sinapisms, and by the free use of mercury. If the practitioner inquired into the rationâle of the treatment, he was told that croup was an inflammation of the larynx and trachea, whose progress was peculiar; that a tenacious leathery substance was produced by the mucous membrane instead of the usual secretion; that this materially interfered with the calibre of the wind-pipe, and thus gave rise to gradual suffocation and death by apnœa. As the onset of the disease was sudden, so must the medication be prompt; and as blood-letting, antimony, and mercury were the most valiant combatants against 'inflammation,' they must be used with decision and energy.

But each physician in his turn found that his soldiers were by no means as worthy as he had supposed; they were indeed like elephants in battle, more fatal to their friends than to their enemies, yet for want of better warriors they were retained and trusted. After a certain lapse of time, however, another was added to them, and they were supplemented by tracheotomy, which, like the reserve of an army, was brought up when the other troops had failed. The new ally was, however, little better than the rest, and the mortality from croup remained almost unchanged. Yet, notwithstanding the defection of all these right-hand men, they were still trusted by the many, and are yet considered by some as the only remedial agents worth employing.

But in an age of progress, when the minds of all educated men are seething with thought, it is impossible for medicine to content itself with defeats, and call them victories. The constancy therefore with which it was beaten in its fight with croup obliged it to quit the field or change its tactics. 'Authority' having failed, reason was appealed to, and thus it was she spoke. Granting that the disease is a local inflammation, what does it do? does it not implicate the muscles of the larynx, and thus make them prone to irregular action, i. e., to cramp or spasm? and have we not practically in 'laryngismus stridulus' a proof that one at least of the symptoms of croup is of purely muscular origin? Again, as the

inflammation produces a secretion which necessarily diminishes the area of the trachea, is it not certain that the patient will require an increased respiratory power to make the necessary amount of air pass through it? Is it not certain that if with a decreased aperture there is also decreased breathing power, the aeration of the blood will be deficient? And if the aeration of the blood be impeded, does not physiology teach us that the lungs become congested? Again, does not pathology teach that congestion of the lungs is found in those who die of croup, even after tracheotomy has been performed? After these preliminaries, is it not clear that every effort is to be made to keep up the respiratory power; and that every thing is to be avoided which would diminish it? Now we know that antimony and mercury and blood-letting do materially diminish the breathing faculties, consequently they are to be deprecated. These things, then, do positive harm in one sense. Does experience demonstrate that they have ever done good in croup, either by diminishing muscular spasm or reducing inflammatory action? Not only are they useless in so doing, but they seem positively to increase the evil. The most rapidly fatal cases are those in which these means are most freely used, and those who have abandoned the use of the means indicated never now meet with that severity of symptoms which appalled their predecessors. Here, as in many other instances, the very weapons with which the physician hoped to bring aid and to save life were in themselves lethal, and frequently the passports to eternity. Having then discarded our old plan of warfare, we proceed to study new tactics.

The first step is to reconnoitre our adversary's position. We find that croup in the child is produced by the same causes as bring about catarrh in the adult; they have, therefore, something in common. Now catarrhal inflammation is comparatively fugitive; we can recognise this readily when it affects the conjunctiva; but it is persistent in direct proportion to the amount of cachexia in the patient. It is probable, therefore, if the sufferer be in tolerable condition generally, that the croupy symptoms will abate spontaneously, just as does the sneezing or coryza which precedes a cold. That they do so I know from positive experience, and in less than twenty-four hours.

We next observe that (constitutional conditions being for the time ignored) the same causes which induce a fit of 'laryngismus stridulus' produce a croupy paroxysm; hence it is clear that some of the symptoms are due to purely local causes.

Again; we observe that one of the most common causes of croup is prolonged exposure to a cold atmosphere, where the wind is blowing directly upon the face; from which we infer that the inflammatory condition is one of reaction, and that it will not be benefited by ice. When we seek for a type of inflammation which is consequent upon a previous exposure to cold, we find it in a common chilblain, and in that phenomenon known to boys as "the hot ache." This inflammation is sometimes very intense, sufficiently so to produce gangrene. Where the type of any inflammation is necessarily asthenic, it is undesirable to bring about asthenia generally. Such an inflammation is croup.

This reconnoitring enables us to know the enemy's tactics when he makes an onslaught. Our first impulse is to examine whether the attack may not be a feint altogether, a simple incursion, to be followed by a speedy retreat. Dropping, however, our metaphor, let us consider the indications of treatment which we deduce from the preceding considerations. 1.—In slight cases no medicaments are necessary; hot moist air and local warmth suffice; talking and laughing are to be deprecated so long as the laryngeal muscles are irritable; fever may be subdued by the free use of oil to the skin. 2.—In more severe cases an emetic of ipecacuan will relax the arid mucous membrane, and thus put an end to that distressing dry stage with which we who suffer from catarrh are so familiar. 3.—To reduce the irritability of the laryngeal muscles opiates may be used, both locally and generally. 4.—We must next endeavour to remove, as far as possible, every irritant from the sensitive spot; and to effect this every breath which is inhaled should be of the temperature of the body, and moist as is the human breath. 5.—Such symptoms as thirst and feverishness may be met by any drink the patient selects; it is certain that under such circumstances a child will neither select spirits, wine or ale. 6.—The occasional inhalation of chloroform may be adopted, if the patient when first seen is in very low condition.

Dr. Eastman informs us (Ranking's *Abstract*, vol. 31, p. 87) that in his practice he has found that croup is more amenable to treatment by quinine than by any other means, and he tells us that he has had some hundreds of cases thus treated without a single death. As an ipecacuan emetic often cuts short an attack of ague, it is possible that its value in croup is due to its action resembling that of quinine.

That the views above are sound I have had frequent opportunities in private practice for observing. Instead, however, of reproducing any of them, I prefer to record one which, though it occurred amongst my patients at the Royal Infirmary, was treated entirely by our house-surgeon, Mr. Chauncy Puzey. A child, about four years of age, was admitted into No. 15 ward, who had so severe an attack of croup that Mr. Puzey's first impulse was to tracheotomise it, so as to avert instant death; but before doing so he prepared an apparatus similar to that generally adopted after the operation has been performed, and resolved to try its effects before, rather than after the operation. The apparatus resembles an ordinary baby's cot, the hood covering the upper part of the body, and effectually preventing draughts of cold air. A kettle of boiling water is then placed upon the fire, and a tube from the spout introduced under the hood, so as to secure warmth and moisture beneath it. Into the place thus prepared, and everything about it being warmed, the patient was introduced; no medicine was given, and the diet was according to the child's fancy. The symptoms immediately began to abate, and in twelve hours the patient was out of danger. On two other occasions Mr. Puzey has had similar success.

Shortly after this occurrence I had an opportunity of conversing with my friend, Mr. Parker, the very able surgeon to the Industrial Schools at Kirkdale, on the subject of croup, and the contrast between the present and the past method of treating it, telling him of the case above recorded. His answer was to the effect that for many years past he and the nurses at the Schools thought nothing of croup. The nurse, on discovering its presence, administered an emetic, and used the hot-air apparatus, which was so completely successful that he was himself scarcely ever sum-

moned to see a case.   Thus, in a large establishment of boys, and
those not of the most robust constitution, croup has, under the
new *régime*, become less formidable than measles, and medicine
has removed a blot from her escutcheon, and fairly asserted her
claim to progress.

When once we satisfy ourselves that the science of therapeutics
has advanced with the age, it is allowable for us to look round and
consider whence the improvement sprang.   We shall then be in a
position to know in what direction to look for more.   Now,
so far as I can judge, some of the Metropolitan Schools can
fairly lay claim to be the leaders of the movement.   London
can boast of two such men as Dr. T. K. Chambers and Dr. B. W.
Richardson, and Edinburgh produces Dr. J. H. Bennett; all of
whom have given an amazing impetus to the science of thera-
peutics; all these are original observers, rather than copyists of
former writers, and we incline to the consideration that the
advance of real medical science has been due to the development
of independent thought amongst the general practitioners, who
have at length been taught that it is incumbent upon a doctor to
cure his patient if possible, rather than to treat him according
to the rules of his art.

So long as there was a supposed orthodoxy in medicine, our art
slumbered as profoundly as did once our National Church; but as
the latter was roused by the fierce energy of Wesley, Whitfield,
and Rowland Hill, and is still further stimulated by the independent
inquiries instituted amongst her own people and by strangers, so
has medicine been spurred onwards by the sharp stings of opposi-
tion; each individual doctor now does his best, irrespective of an
orthodox school, and thus helps on the march of knowledge.   We
hail, therefore, opposition as the best friend of progress, and to it
we look for continuous success.

DEPOSIT OF STRUMOUS MATTER WITHIN THE GLOBE OF THE EYE, SIMULATING MALIGNANT FUNGUS, WITH REMARKS.

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FANNY T., aged 15, was admitted an in-patient at the Eye and Ear Infirmary, April 22nd, 1867. She was of medium height, and spare habit, with pale complexion, and rather delicate aspect, her general health had been fair, but never robust.

About four months previous to admission, she became subject to pain over the left eyebrow, of a dull heavy character, nearly constant, and worse at night, and on lying down. During three weeks earlier she had observed that all objects looked at seemed smaller than usual. Vision with the left eye had declined gradually, and for a month past had been, as on admission, absolutely null. The pupil was dilated about one-third beyond its normal size, and was fixed, but regular. The globe was enlarged towards the outer and lower side, in the form of two rounded elevations, about the size of large peas, which were overspread with vascularity; there was no pain on pressure, but the eyeball felt firmer to the touch than natural. On looking into the pupil an opacity was visible behind it, apparently in the situation of the posterior capsule of the lens; it presented an opaline tint in some positions of the eyeball, but when the globe was rolled sinistrad, it assumed a yellowish wash-leather hue, the surface exhibiting a metallic lustre, with red vessels running over it. This opacity presented the appearance of a new growth, and seemed to be of soft consistence. She had not suffered from photopsia or muscœ at any time, but at night was disturbed by pain; the appetite had fallen

off, and the pulse was feeble. The right eye was sound, but its functions were impaired by sympathy with the other.

She stated that she had been brought up in the country, but a year ago had removed to a neighbouring town, where she resided with a relative who kept a butcher's shop, and there she had been in the habit of sitting up late at night by gas-light.

My impression, after examination of this case, was that I had to do with a malignant disease, probably fungus, which was advancing towards the cornea. It was seen and examined by one of my colleagues at the Infirmary, and by the assistant surgeon, who both came to the same conclusion.

The day after this patient was admitted into the Infirmary, I observed that the swelling on the outer side of the eyeball had enlarged considerably, and assumed a somewhat pointed form; the following day this was still more marked, and, at the suggestion of another of my colleagues, it was resolved to make an exploratory puncture with a broad needle.

The swelling was punctured at its most prominent point, and a large quantity of healthy-looking pus escaped, tinged towards the end with a little vitreous humour. The patient slept better the following night, and was almost entirely relieved from the head-ache which she had previous to the operation. On examining the eye the following day, the swelling of the globe was found to be much diminished in size, and on looking into the pupil, the opaque substance formerly visible had evidently retreated much further back, and no longer presented the same yellowish metallic appearance. From this time the patient continued to improve, the pupil regained a certain amount of motion, and she was able to distinguish her hand. At a later period vision still further improved, so that she was able to count her fingers, and also to distinguish the white colour of my shirt front and a watch chain, as I stood before her facing the light. After this the eye continued much the same, but as her general health rather declined, it was thought desirable that she should return to the country. She therefore left the Infirmary on May 7th, having been an in-patient for about a fortnight.

On May 26th she was re-admitted, stating that she had again

become subject to pain of the eye and head soon after returning home, and which had continued more or less ever since. She had fallen off in health and strength during her absence in the country, and a prominent cone-shaped eminence had again developed itself on the lower and outer side of the eyeball, but firmer in consistence than on the last occasion. Vision was now completely abolished, but the pupil was still regular and clear, though fixed. The tumour was again opened, by a pretty deep incision into its substance, but no matter escaped. The symptoms were not much relieved, the pain still continuing, and subsequently a considerable quantity of matter was discharged from the wound on several occasions. The globe continued to enlarge, and became more vascular and painful, and blood was effused into the anterior chamber; the patient's rest was disturbed, and her appetite and strength failed rapidly. In these circumstances, it was obvious that no alternative remained but to extirpate the eyeball, which was accordingly done, the patient having been previously brought under the influence of chloroform. Before removing the globe, a deep incision was made into the tumour, giving vent to a small quantity of straw-coloured fluid and degenerated vitreous humour. The extirpation was accomplished without difficulty. On making a vertical section of the globe, after its removal, a thick layer of curdy-looking strumous matter was found to be interposed between the inner surface of the sclerotica and the more internal tissues, the choroid and retina being pushed towards the centre, and the vitreous humour much diminished in quantity and disorganised. The lens still remained *in situ*, and retained its transparency, but was reduced in size. The operation was followed by immediate relief to all the constitutional symptoms, the patient rapidly improved in all respects, and left the Infirmary again on the 17th of June.

Two circumstances appear to me worthy of note in this case. 1.—The close resemblance which certain of the appearances presented to those of malignant fungus in its early stage. I do not enter upon the debatable question, whether this was in any sense a malignant form of disease; it certainly was not a case of fungus hæmatodes, which I at first supposed it to be. Acting

upon this supposition, I had resolved to extirpate the globe at once, but the rapid alteration in the external appearance of the eyeball, and the result of the exploratory puncture, awakened a feeling of satisfaction that I had not carried this resolution into effect. The further progress of the case, however, showed that extirpation in the first instance would have been the wiser course after all; but we live to learn, and our errors in diagnosis, if rightly considered, may prove more serviceable to us than our more truthful discriminations. 2.—I would remark the imme- diate and permanent relief afforded by the removal of the globe. There is every probability that, if left to itself, the irritation and exhaustion induced by the disease would have terminated this girl's life; as it was, she had no sooner recovered from the effects of the chloroform administered previous to the operation than, to use an old but expressive phrase, "she never once looked behind her." She slept well, regained her appetite and spirits, and seemed in every respect a new creature.

I may mention, in conclusion, that I have seen her several times since she left the Infirmary as an in-patient. The last occasion, August 14. She was then in her usual health, and will shortly be able, if she chooses, to wear an artificial eye.

ON WATER AND ITS IMPURITIES.

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LECTURER ON CHEMISTRY AND TOXICOLOGY AT THE LIVERPOOL ROYAL INFIRMARY
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It will scarcely be necessary to apologise for the subject of this article, although it is one which has been often discussed, both in scientific circles and by the general public. The mind of the nation seems to have been of late awakened to the great importance of a sufficient supply of pure water, and to the fact of disease and death arising from the pollutions so commonly to be found in that which is in many cases still supplied. The outbreak of cholera last year repeated the lesson of previous visitations, and it will be well if this lesson be not lost upon the community, or forgotten until it be repeated, as it most certainly will be if neglected. I do not, however, propose to limit the discussion of water impurities to those forms alone which are supposed to lead to the spread of epidemics; I prefer to include all the commonly occurring varieties, as the present seems to be a favourable time for reviewing the knowledge we already possess respecting them.

In chemical language, any substance dissolved or suspended in water;—any material, whether solid, liquid, or gaseous, which is found in addition to its chemically combined oxygen and hydrogen, constitutes an impurity. In this sense an impurity is not necessarily *injurious*. Some are perfectly harmless, or even, in certain cases, beneficial; others are doubtful; some are certainly noxious. Chemically pure water is seldom or never found in nature; probably the nearest approach to it exists in rain-water after long continued

rains, but even this contains impurities, principally gaseous, derived from the atmosphere.

The same substances will be found in much greater proportion at the termination of a long dry season. Various soluble gases are contained in the atmosphere, whether naturally present, as oxygen, nitrogen, and carbonic acid gas, or resulting from various chemical actions of decomposition or oxidation, proceeding on or above the surface of the earth, as ammonia, and the vapours of nitrous and nitric acids. Rain water accordingly is found to contain ammonia, nitrite of ammonia, and nitrate of ammonia, together with small amounts of the gases first mentioned. In large towns various substances of organic origin are present in the atmosphere; but most of these are gradually oxidised and converted into harmless compounds. Again; into the atmosphere of colliery districts, notably where there are coke-ovens, as well as into that of towns, a large amount of sulphurous acid gas is constantly being poured; this gas is quickly converted, by oxidation, into sulphuric acid. Rain water in these localities will contain sulphate of ammonia, and probably at times free sulphuric acid. I have found abundant evidence of this in the rain water of Wigan. None of these impurities can be considered of any moment; their proportionate amount is very small, and, even were it larger, there is no reason to suppose they would be injurious. The peculiar taste of rain water is sometimes ascribed to the absence of the substances commonly met with in solution in spring water; but there can be little doubt it arises from atmospheric impurity, and it may be removed by an ordinary filter. In country districts the rain water will almost certainly act upon lead, and if it be collected from a leaden roof, or stored in a leaden cistern, it will become contaminated with that metal. In large towns, according to Miller, the rain water is generally so impure as not to have this action; yet the rain water of Wigan, already mentioned, has strong action upon lead.

Filtered rain water free from lead may be regarded as the safest, and on the whole the most to be recommended form in which water can be obtained for drinking and cooking.

On soaking into the ground, the water which has fallen as rain dissolves whatever soluble matters the soil and rocks may contain; and thus we obtain the various descriptions of spring and river water. The impurities present may be of organic, or of mineral origin. There will always be more or less soluble matter derived from that portion of the soil which is of vegetable origin. If this be in large amount the water will have a dark tinge, as was the case with the Rivington water when first brought to Liverpool. But organic matters exposed to the influence of oxygen, especially when in a state of fine division, gradually become oxidised; and this action is constantly taking place in water containing it. The products of oxidation consist almost entirely of carbonic acid and water. A portion of the carbonic acid remains in solution; the rest, coming off in minute bubbles, gives to spring water its well known sparkling character. Such carbonated water has a much greater solvent action upon many mineral substances, particularly the carbonates of lime, magnesia, and iron, than pure water has. The two first of these are accordingly amongst the commonest impurities of natural waters, and the last is very frequently present, though usually in small proportion.

The nature of the mineral impurities of spring and well water will depend on the composition of the soil and rocks, with which it has been in contact. Thus in the case of hard slaty or gritty rocks, such as are common in the older geological formations, and in the hilly parts of the country, there is very little capable of being readily dissolved, and the natural waters of such districts usually contain but a very small proportion of mineral matter. On the other hand, in calcareous districts, as in those of the Carboniferous Limestone, and in the chalk districts of England, a considerable amount of lime, chiefly as carbonate, is found in the water of springs; accompanied by carbonate of magnesia in smaller proportion, and by the sulphates of lime and magnesia. The other commonly occurring mineral impurities are chloride of sodium, and silica; the latter usually in very small proportion. The following analysis, which I have lately made of a spring water from Cumberland, will serve as an example; it may be regarded as a water of very fair quality.

Grains per Gallon.

Carbonate of lime . . . . 2·10
Carbonate of magnesia . . . . 1·62
Sulphate of lime . . . . 1·77
Chloride of sodium . . . . 1·11
Chloride of calcium . . . . 0·12
Silica and oxide of iron . . . . 0·21
Nitrites (a trace) . . . .
Loss . . . . 0·38

Total fixed or inorganic solids . . . . . 7·31
Organic and volatile matter . . . . . . 0·87

Total solid matter . . . . 8·18

Hardness . . . . 4°·9

The following is an analysis of the Rivington water, made a few years since by my predecessor, Dr. J. B. Edwards.*

Grains per Gallon.

Carbonates of lime and magnesia . . . . 1·01
Sulphate of lime . . . . 2·30
Chloride of sodium . . . . 1·90
Silica . . . . 0·20
Oxide of iron (a trace) . . . .
Organic matter . . . . 2·06

Total . . . . 7·47

The composition of river-water will of course resemble that of the springs from which it is chiefly derived. By contact with the atmosphere, however, and by the agitation of motion, much of the excess of carbonic acid contained in the latter escapes; and a corresponding amount of earthly carbonates becomes separated and deposited. Thus "the calcareous springs in the chalk districts around London contain from 18 to 20 grains of chalk per gallon; six or eight grains of which become separated by exposure of the water to the atmosphere, so that a running stream will seldom

* "An inquiry into the properties of the Rivington water, by J. B. Nevins, M.D., and J. B. Edwards, Ph.D., F.C.S."

contain more than twelve or fourteen grains of chalk per gallon in solution."—[MILLER.]

In connection with the recent schemes for supplying water to London, Liverpool, and other large towns, it will be interesting to note the composition of certain lake waters, according to the analyses of Professor Way.

	Grains per Gallon.		
	Haweswater.	Ullswater.	Thirlmere.
Carbonate of lime	0·90	1·45	0·75
Carbonate of magnesia	0·36	0·42	0·29
Carbonate of soda	0·56	0·40	0·20
Sulphate of soda	0·90	0·65	0·78
Chlorides of sodium and potassium .	0·40	0·69	0·77
Oxide of iron, silica, &c.	0·25	0·20	0·05
Organic matter	0·62	0·35	0·77
Total solid matter	3·99	4·16	3·61
Hardness before boiling	2°·0	2°·1	1°·5
Hardness after boiling	1°·8	2°·1	1°·5

Professor Way's opinion of these waters is that any one of them, or a mixture of them, would be admirably suited for the domestic supply of town populations, whether large or small.

A class of impurities must now be considered, which are of the greatest importance in reference to questions of health; those, namely, which are of organic origin. Thus, surface drainage water will contain some of the soluble organic matter, chiefly vegetable, derived from the soil; if it flows over cultivated land, it may be further contaminated by animal matter from manure; and finally, in innumerable cases, the products of human and animal excretion find their way into it, either on the small scale, as with town, village, and farm wells, or wholesale, as where the sewage of a town is poured into a stream. The subsequent history of these organic impurities is instructive. Chemically they may be arranged under two heads—the non-nitrogenous and the nitrogenous. As all organic beings contain nitrogen, it is evident that this element must be found amongst their products of decay, as well of vege-tables as of animals. But the former contain a comparatively very small amount, hence much the larger proportion of the vegetable

organic matter will consist of substances composed of carbon, hydrogen, and oxygen only. On the other hand, that which is of animal origin will be distinguished by its containing a large amount of nitrogen united with these same three elements. There will also be a little nitrogenous matter of vegetable origin. With regard to properties, however, no distinction can be drawn between nitrogenous matter of animal and that of vegetable origin. Whatever its source, it is always characterised by its chemical instability. Azotised compounds, when no longer under the influence of life, if in presence of moisture, immediately begin to undergo changes, splitting gradually into less and less complex compounds, and finally becoming oxidised, and thus in a sense destroyed. The change will be the more rapid in proportion to the fineness of division of the material; notably therefore when in solution or suspension in water. Of the elements constituting the azotised matter, the carbon will ultimately become carbonic acid gas, and the hydrogen will form water. The same thing will occur to the carbon and hydrogen of non-azotised matter. The nitrogen, the peculiar element of the former of these classes of substances, will be first converted, mainly, into ammonia; by further change of oxidation, all the nitrogen will pass into the state of nitrous or nitric acid, which, by acting on the carbonates present, will appear in solution in the form of nitrites and nitrates respectively.

At a certain stage, then, we shall find in the water an amount of unchanged or partially changed nitrogenous organic matter, together with ammonia, nitrites, and nitrates, the products derived from impurities previously present. Such will be the character, for example, of a well water fed by farmyard in-drainage, and of a river water just below the point where it receives town sewage. If we follow the latter in its downward course, we shall find that first the unchanged or partially-changed nitrogenous organic matter will cease to be detected, then the ammonia will more or less disappear, until finally the only evidence of the previous contamination of the water, by the substances I have referred to, will be the nitrites and nitrates still present (these latter remaining permanently), with or without traces of ammonia.

It has been stated that the bulk of vegetable organic matter is

composed of substances formed of carbon, hydrogen, and oxygen. Such substances are, as a rule, less liable to change than those which also contain nitrogen; yet when in contact with nitrogenous matter in a state of change, the chemical action is communicated to the non-azotised matters, which are thus rendered as unstable as the rest. Under the circumstances which have been described, where water takes up vegetable matter, such contact is inevitable. The result is the slow decomposition and ultimate oxidation of the whole of the organic impurity present in the water.

We must return for a few moments to the consideration of an impurity already mentioned, namely, lead. Spring and river waters act very differently upon this metal, according to their composition. As a rule, the softer the water the greater is its power of dissolving lead. The action is also favoured by the presence of chlorides or nitrates. Dr. Nevins has shown that the presence of solder in a leaden cistern favours the solution of the metal, by establishing a galvanic current. Hence, cisterns which are made by "autonomous soldering" are to be preferred, if lead must be used at all. In the experiments performed by Drs. Nevins and Edwards (described in the pamphlet already named), they found that Rivington water was acted on by lead in all cases, the metal becoming dissolved. My own observations have shown the same thing. It is highly desirable, therefore, that Liverpool water should not be stored in leaden cisterns.

We may next inquire briefly into the character and effects of the various classes of water impurity. As to mineral matters, it will not be necessary to consider any but the compounds of lime and magnesia. These are the ingredients to which, almost entirely, the *hardness* of water is to be ascribed, this quality being recognised by the action of such water upon soap. When soap is used with hard water, its organic acids unite with the lime and magnesia present, forming insoluble curdy-looking compounds. Until the whole of these bases has been so combined, the soap can exert no cleansing power, and is therefore destroyed without equivalent. The late Dr. Clark devised a method of indicating the amount of hardness in waters, which is now almost

universally employed. Each degree of hardness represents one grain per gallon of carbonate of lime, or its equivalent amount of other hardening ingredient in solution. Thus water of 10° of hardness contains either ten grains of carbonate of lime in the gallon, or such an amount of hardening material, of whatever nature, as will destroy as much soap as the ten grains of carbonate of lime. After prolonged boiling, the hardness of water is usually lessened, the difference representing approximately the amount of earthy carbonates originally present held in solution by carbonic acid. The permanent hardness is chiefly due to earthy sulphates.

Some have suggested that the presence of lime in potable water is desirable as an article of diet, to supply the waste of the tissues containing it. But the hard tissues change very slowly, and there seems to be quite a sufficiency of lime in ordinary articles of food to supply their waste. On the other hand, there is no reason to suppose that hard water is injurious; nor am I aware of any facts which support the popular notion that it is liable to produce calculous disorders. Still, from considerations of cleanliness, there can be no doubt that water supplied to towns should be as soft as possible. The hardness of several lake waters has been given. That of Bala Lake (which contains 2·08 grains of solid matter per gallon) is 0°·8. That of Loch Katrine is 0°·2. That of the Thames, as supplied by the Metropolitan Water Companies, is about 13°. The water supplied to London by the Kent Company is as high as 16°. The hardness of the Liverpool water varies, I believe, according to the proportions in which the Rivington and well waters are mixed. On July 12th I found it to be 4°·6, as supplied to the laboratory of the School of Medicine.

It is difficult, from the absence of rigidly ascertained facts, to speak definitely of the effects produced by organic matter in water, yet there are some conclusions which may be drawn with safety. Many observations unite in proving that nitrogenous organic matter in a state of decomposition is injurious. This has often been shown in the case of solid articles of food, which in particular stages of decay frequently give rise to symptoms

of irritant poisoning. But, what is more to the purpose, the habitual use of decomposing food, as in case of the "rast" of the Faröese, produces very considerable derangement of the digestive system, and, most important, a *strong constitutional tendency to the contraction of zymotic diseases.* [See Dr. Carpenter's *Human Physiology*, 6th ed., p. 48.] Many cases have occurred which teach us that similar matter present in drinking water produces exactly the same effects; and it is universally felt that one of the most important aids in the prevention of epidemics is a plentiful supply of pure water. With regard to cholera, it is certain that the draining of sewage into well water is a most potent cause of the spread of that disease. [For cases, see Dr. Frankland's paper on " Water Supply and the Cholera," in the *Quarterly Journal of Science*, July, 1867; also Dr. Lankester's Reports on Public Health, in the same periodical. See also Dr. Frankland's lecture on Water, delivered at the Royal Institution, and fully reported in the *Laboratory* of June 1st.]

With regard to the non-nitrogenous organic impurities of water, it is generally assumed that they are either less injurious than the former class, or that they are positively innocuous. In the absence of known facts, it is impossible to state the value of this opinion. That such matters are less objectionable than nitrogenous is most probable; that they are quite harmless is most doubtful. On the whole, it is safest to look with suspicion, or to reject, water which analysis shows to contain a notable quantity of organic matter of whatever kind, and particularly if nitrates are present; as these, though harmless in themselves, point to nitrogenous contamination. Any attempt to fix a definite amount must be more or less arbitrary; but if we condemn all waters which contain more than *two* grains of organic matter per gallon, we shall scarcely be erring very far on the side of safety. Before mentioning the composition of certain specimens, it is desirable to say a word on the method of analysis. The total solid impurity is ascertained by evaporating a known quantity to dryness, after addition of a known weight of carbonate of soda (to prevent loss by the decomposition of

chlorides), and keeping the residue for a time at a temperature of about 260° F. It is then ignited, carbonic acid (in solution, or as carbonate of ammonia) added, to reconvert any decomposed carbonates, and the whole again gently heated. The difference between the weights before ignition and at the close represents the volatile matter. This consists almost entirely of organic matter, which may, however, be accompanied by the volatile constituents of nitrites and nitrates, and by some water which has been strongly combined. The result, therefore, represents the state of the water as to organic matters not quite accurately, but approximately. A few instances will now be instructive. The water supplied to the metropolis by Thames companies in September, 1866, contained volatile matter varying from 0·76 to 1·00 grains per gallon. During the late outbreak of cholera, specimens of water from five wells, extensively used in and near Wigan, were examined by Dr. Angus Smith, who found respectively 20·23, 5·89, 2·02, 5·42, and 2·06 grains of organic matter per gallon. All the five contained nitrates, the first two in immense quantity. Shortly afterwards I examined the waters of ten wells used in Hindley and Ince, where also cholera made great ravages. The organic and volatile matter amounted respectively to 9·24, 10·05, 9·88, 11·55, 3·09, 6·52, 4·37, 4·93, 7·13, and 11·75 grains per gallon. All except one contained nitrates. It is not easy to conceive a worse state of things, for in those townships the wells form the sole sources of water supply.

It has long been felt that the method of analysis already described was far from giving a clear account of the condition of a water as to its organic impurities. Dr. Frankland has lately adapted a much improved system with regard to the metropolitan waters. He estimates the total amount of combined nitrogen, the amount present in the form of nitrates and nitrites, and the ammonia. On an average, the amount of combined nitrogen is about 0·4 parts in 100,000. The oxidised nitrogen corresponds to a previous sewage contamination of about 2,500 parts in 100,000 (as calculated from a comparison of average filtered London sewage). There is no appreciable difference

between the total nitrogen and the oxidised nitrogen, showing that before the water is delivered the nitrogenous organic matter has become thoroughly oxidised, and thus rendered harmless. The water of Loch Katrine contains 0·04 in 100,000 of combined nitrogen.

On the other hand, Messrs. J. A. Wanklyn, E. T. Chapman, and M. H. Smith, of the London Institution, condemning Dr. Frankland's system of analysis as untrustworthy, have adopted another. They estimate the free ammonia present in the water, and afterwards convert the combined nitrogen into ammonia by distillation with various oxidising agents. The conclusions they have arrived at from various analyses are, briefly, that the water of deep springs is best adapted for town supply, and that derived from rivers and lakes is objectionable as containing too much "albuminoid" nitrogen. Mr. R. H. Smith, after examining the water of Bala Lake by this method, condemns it as being organically as bad as Thames water. The authors of the method have also condemned the water of Loch Katrine. The system, however, is as yet in its infancy, and this will induce considerable hesitation in accepting these conclusions, so different from the opinions generally held by chemists. Many chemists have endeavoured to compare the organic contamination of waters by the use of permanganate of potassium. Dr. Frankland, how-ever, has conclusively shown that no reliance can be placed upon this method of estimation.

It will be unnecessary here to speak of the various schemes which are afloat for supplying London and other towns with pure water. There remain to be considered innumerable small towns and villages, which are not taken account of in any of the schemes. I would observe here, that since water which is to be used for drinking and cooking must possess qualities which are not required in that intended for other purposes, it is not necessary that the whole of the water supplied should be pure, but simply that required as stated. And although for large towns it may be more feasible to have a single than a double service, in other cases the latter may be preferable. I have already stated the advantage of using filtered rain water stored in slate cisterns

or wooden tubs. A cheap filter, within the means of the working classes, is much to be desired. Perhaps a large flower-pot containing animal charcoal (or the magnetic compound described in the *Lancet* of July 6th), sand, and pebbles, would make a fair substitute. With regard to filters in general, late experiments by Mr. Byrne show that the purifying power of a new filter is no criterion of its permanent value. It is essential, before deciding upon its merits, to examine its action after a large quantity of water has passed through it.

When a supply of bad water is inevitable, and filters are too expensive, it is important to have a ready means of to some extent neutralising or destroying the noxious ingredients. The best seems to be the employment of the alkaline permanganates, such as "Condy's fluid." Supposing the drinking water is kept in a white vessel (if in a dark one, a white plate may lie at the bottom), the fluid is added, with stirring, until the whole acquires a faint pink tinge, as seen against the white surface. In a few moments this will usually have disappeared. The treatment should be repeated two or three times a day, and as often as fresh water is added. In this case the permanganate seeks out and oxidises just that portion of the organic matter which is most objectionable ; that, namely, which is most rapidly decomposing and ready for oxidation. But, after all, such expedients are only, like the miner's safety lamp, of use in temporarily enabling the owner to find a place of safety—a sufficient supply of pure, uncontaminated water.

DESCRIPTION OF A CASE OF
TRUE HERMAPHRODITISM, WITH REMARKS.

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THE subject of this malformation was admitted as a female into
the Royal Infirmary, under the care of Mr. Bickersteth, April 18th,
1867. She gave her name as Mary W., and stated that her age
was 39, but she looked much older. She earned her livelihood as
a street hawker. She was tolerably stout and thick set, and rather
tall for a woman. The complaint for which she was admitted was
that of dry gangrene of the right foot, the toes and part of the
heel being in a state of sphacelus; there was also ulceration of the
leg. As soon as her bonnet was removed, it was noticed that she
had been in the habit of shaving, for about a day's growth of
what would have made a tolerably thick beard was at once obvious.
Her voice was deep-toned, and decidedly masculine in character.

Some suspicion being entertained as to her true sex, she was
ordered into a bath, much against her will, and it was then dis-
covered that she was a hermaphrodite. The gangrene of the foot
and the ulceration of the leg seemed to be progressing favourably,
till the night of the 21st, when, without any known cause, she was
seized with a severe attack of purging, followed by obstinate
bilious vomiting, which continued without any improvement until
the morning of the 24th, when she died with symptoms of collapse.
During her illness she never complained of any pain or tender-
ness over the abdominal region. It was accidentally discovered by
the nurse that she had brought a razor in her pocket. While an
inmate of the Hospital she was very quiet and taciturn, never
speaking unless spoken to, and unfortunately, in consequence of

her unlooked-for death, no questions as to the sexual feelings were put to her, except as to the menstrual function, to which she replied that she had every month a slight coloured discharge. She was retired and solitary in her habits, always sleeping in a room by herself. For the foregoing particulars of her case, I am indebted to the courtesy of Mr. Puzey, the House Surgeon.

On the post-mortem examination several patches of ulceration were found, in the lower portion of the ileum and in the commencement of the colon; they seemed to be of recent origin, there being no cicatrices visible. One had passed on to perforation, which, by producing peritonitis, was the cause of death. The aorta and the arterial system was the subject of advanced calcareous degeneration. The accumulation of adipose tissue in the abdomen was excessive.

Description of the Body. — The body was covered by a thick layer of subcutaneous fat. The forehead was broad and smooth, and the eyebrows were not strongly marked. The hair of the head had been worn long like a woman's, and was somewhat grey. On the cheeks, upper lip, and chin, was a greyish stubble, and if the hair had been allowed to grow on these parts, a very fair moustache and beard would have resulted. The nose was small and well proportioned, the ears were also small, and pierced for ear-rings; the neck was short and thick; the shoulders were broad and square set; the chest was large, and the abdomen corpulent. The general contour of the trunk was decidedly masculine, and disproportionately large to the extremities, which were small and feminine in character. The pelvis appeared to be somewhat wider than in a well formed man. The mammary glands and nipples were entirely undeveloped. The skin of the trunk and extremities was fair and smooth, and singularly deficient in hairy growth.

Description of the external parts of generation. — The mons veneris was large and prominent, and but sparsely covered with hair. Below it, was a distinct penis measuring, without stretching, two inches in length, and upwards of two inches in circumference. The organ possessed a very perfect glans, except that it was imperforate; and it had also an ample prepuce, which was retracted

behind the glans. The dorsal aspect of the penis had a most natural appearance, but its under surface was very imperfectly developed, being only covered by mucous membrane. The corpus spongiosum was altogether absent, and in its place ran a groove, representing the normal urethra, from the glans for two-thirds of an inch backwards. The prepuce was attached on the under surface of the organ along the margins of the urethral groove, and then passed downwards, as a strong fold or frænum, to the orifice of the urethra, which was situated between the labia, very much as in the normal female parts. By this band the penis was tied down, so that erection, properly speaking, must have been impossible. The skin folded on each side of the root of the penis, to form labia majora. These labia in some respects resembled the ununited scrotum of the hypospadic male, but far more the labia of the female, to which they were similar not only in shape and size, but in the way their inner surfaces lay in exact apposition, except at the upper part, where they were separated by the overlapping penis. Between the labia in the median line, two and a half inches from the anus, was the urethral opening, into which a No. 12 catheter could be readily introduced by directing it downwards and backwards. The posterior border of this orifice was formed by a crescentic fold of mucous membrane, while anteriorly the opening was continuous with the urethral groove of the penis. There were no traces of nymphæ, or of a vestibulum vaginæ. Posteriorly the labia blended with the skin of the perinæum, about an inch from the anus.

Description of the internal genito-urinary organs.—On looking into the pelvis the bladder was seen lying in its normal position, and behind, and adherent to it, was felt a solid body, evidently the uterus, the fundus of which projected slightly above the level of the bladder. The peritoneum was reflected directly from one organ to the other without forming any vesico-uterine pouch, and it extended laterally from the sides of the uterus and bladder to the brim of the pelvis, forming two distinct broad ligaments. From the fact that the uterus was not fairly in the middle line,

but lay considerably to the left side, the left broad ligament was necessarily shorter and smaller than the right.

Dissection of the parts.—On laying open the bladder, it was found to be normal in size and shape. The urethra, which measured one inch in length, joined the vagina about half-an-inch from the common external orifice, and presented no unusual features. The vagina was about two and a half inches long, and devoid of rugæ; its calibre was sufficiently large to admit the little finger, except near the external orifice, where it was very constricted. Tracing it upwards, it was found to be continuous with the cavity of the uterus, which has been described as connected with the posterior wall of the bladder. The uterus was provided with a distinct os externum, the lips of which were clearly recognisable. On slitting up the organ itself, the arbor vitæ of the cervix was found to be well developed, and the cavity of the uterus was large in proportion to its bulk; the walls, on the other hand, being only the eighth of an inch in thickness. Passing to the structures found in the broad ligaments on the left side, there was a fallopian tube, perfectly developed, and of a size proportionate to that of the uterus; it terminated in an open fimbriated extremity, from which a very fine probe could be passed into the cavity of the uterus. On this, the left side, an imperfect round ligament could be traced, but no vestige of a genital gland, whether testis or ovary. Very singularly, however, in the immediate neighbourhood of where the genital gland might have been expected to lie, and within a short distance from the fimbriated extremity of the fallopian tube, there was a somewhat ill-defined body, which looked like a lobule of fat, projecting, so as to be almost pendulous, from the surface of the ligament. When the peritoneum and fat were removed from it, it was found to contain a series of tubules, which in their arrangement corresponded exactly to those which form the parovarium or organ of Rosenmüller in the normal broad ligament; in fact, it might be considered as a tolerably well-marked specimen of a parovarium. Turning to the right broad ligament, there was seen, as upon the left side, a distinct fallopian

tube, only not so large or so well developed as the left one. Its canal was also continuous with the uterine cavity, but its fimbriated extremity was very feebly marked and was not patulous. This fimbriated extremity was adherent to a body which represented the right genital gland. On examining carefully the genital gland, which was about the size of a half grown acorn, it was found to be distinctly of the nature of a testicle. A section of it presented the characteristic lobular appearance of that organ, and portions of it, when placed under the microscope, were found to consist of convoluted tubes $\frac{1}{200}$th of an inch in diameter. At a short distance from the testicle was a small firm mass, which was found to be the globus major or caput epididymis, the coni vasculosi of which were clearly traceable. From the caput epididymis an exceedingly tortuous duct, which must be considered as the representative of the body and globus minor of the epididymis passed between the layers of the broad ligament towards the body of the uterus, in a direction nearly parallel with that of the fallopian tube. As it approached the uterus, it became less and less tortuous, and finally almost straight. It could be traced with great ease, running down the side of that organ, very closely connected to it, to a point nearly on a level with the os uteri, where it abruptly terminated in a cæcal extremity. The greater part of that portion of the tube which ran down the side of the uterus was very much dilated and presented, when laid open, a number of imperfect septa stretching across it, which gave it an appearance not unlike the duct of the gall bladder. The existence of any distinct connection between the testicle itself and globus major of the epididymis was very difficult to determine, as a careful examination only showed one or two delicate uniting filaments, which might be considered as representing the vasa efferentia, and whether these were permeable or no, it was impossible to ascertain.

Briefly, then, to recapitulate: there were present in this subject a tolerably developed vagina and uterus, in the left broad ligament were found a fallopian tube, a round ligament, and what was considered to be a parovarium, but no trace of either testicle or ovary; while in the right broad ligament there existed

a fallopian tube and a distinct testicle with an epididymis and a vas deferens, which was traceable on the side of the uterus as far as the cervix, the junction, however, between the testicle and the epididymis being very feebly, if at all, developed. The conformation of the pelvic cavity may be regarded as intermediate between the male and female types. The following are the measurements of the diameters of the inlet:—

	Inches.
Antero-posterior	$3\frac{2}{3}$
Transverse	5
Oblique	$5\frac{1}{8}$

There is one point in connection with our case which requires a passing comment, namely, the alleged partial occurrence of the menstrual function, although, as was afterwards ascertained, no ovaria existed. I do not think we ought to doubt altogether the truth of this statement, as the interior of the uterus represented a large surface, the lining membrane of which had a most natural appearance, and, moreover, the person herself could hardly be supposed to have any object in deceiving.

We have now to consider the subject of hermaphroditism, and the best way to obtain a clear comprehension of these malformations is to make ourselves acquainted with the natural development of the genital organism in intra-uterine life; for the investigations of modern embryologists have been of the greatest assistance in enabling us to understand the possibility of their occurrence. I have thought proper, therefore, here to introduce a short summary of the foetal development of the internal generative organs.

In early embryonic life, situated below the kidneys, on either side, are two conical-shaped organs named the Wolffian bodies. These structures act as the primordial kidneys, and as the latter become developed they disappear. Each Wolffian body possesses an excretory duct, which runs down from its summit along its outer side, and opens into the allantois, or rather into that part of it which is known as the uro-genital sinus. Upon the inner side of these bodies there soon appears a genital

gland, which is the future testis or ovary. About the same period of embryonic existence a whitish band, which afterwards becomes hollowed out into a tube under the name of Müller's duct, is developed on the inner surface of each Wolffian body, opening below into the uro-genital sinus close beside the excretory duct. So far as development has yet proceeded, the rudimentary structures necessary to the organism of either sex are present, and according to the type or innate sexual impress of the new being will depend the development of some of the structures and the atrophy of others. Thus, in the male the excretory ducts of the Wolffian bodies are developed into the vasa deferentia, and the genital glands assume the characters of the testis, while Müller's ducts cease to · grow. In the female, on the contrary, Müller's ducts are developed into fallopian tubes, uterus, and vagina, and the genital glands assume the character of ovaries, while the excretory ducts cease to grow. The upper ends of the Müllerian ducts form the fallopian tubes, and in animals the cornua or horns of the uterus; while their lower ends become fused together into a single tube, which at a later period is differentiated into the body of the uterus, the cervix, and the vagina. Where the fusion is not complete, a double uterus or vagina is the result. The Wolffian bodies themselves, as the above-mentioned parts become developed, gradually dwindle away, and upon their summits is developed a new formation, dissimilar to the Wolffian body proper, which, in the male, ultimately forms the globus major of the epididymis; and in the female, the series of tubules situated between the layers of the broad ligament close to the ovary, which is known as the parovarium or organ of Rosenmüller.

In the adult female, the remains of the primitive excretory ducts are ordinarily to be found under the name of Gaertner's ducts, on the anterior aspect of the vagina in the lower animals, especially the ruminantia, and they may be considered to represent the vasa deferentia of the male.

In the adult male, the remains of the primitive Müllerian ducts are represented by the sinus-pocularis or utriculus in the

prostate gland, which is the analogue of the uterus and vagina of the female.

The following table will make this brief account more easily understood :—

Table illustrative of the development of the common primary fœtal genital system, according to the sexual type.

	IN THE MALE.	IN THE FEMALE.
GENITAL GLANDS	Testes.	Ovaria.
MULLERIAN DUCTS	Disappear (except as the sinus pocularis) .	Fallopian tubes, uterus, and vagina.
EXCRETORY DUCTS OF WOLFFIAN BODIES .	Vasa deferentia .	Disappear in the human subject, (remains, if in the lower animals, under the name of Gaertner's ducts.)
NEW FORMATION ON THE SUMMITS OF THE WOLFFIAN BODIES . . .	Globus major of epididymis .	Parovarium or organ of Rosenmüller.

With respect to the development of the external organs of generation, it is quite sufficient for me to state that the scrotum corresponds to the labia majora and the penis to the clitoris.

I would observe, in anticipation of the subject we are about to consider, that as we have seen only one genital gland, whether testis or ovary, appears on each side in connection with its Wolffian body, we ought to be exceedingly cautious in believing that both organs have ever been found on the same side, and indeed we may be sure that, in cases where such an anomaly was supposed to exist, there was a fallacy somewhere. The subject we have before us, which is one of great interest, has been very fully worked out by Sir James Simpson, in the *Cyclopædia of Anatomy and Physiology,* and I have liberally availed myself of his valuable researches.

Hermaphroditism has been divided into two classes, the true and the spurious. The spurious is that in which the imperfection is confined to the external organs. In the male it is commonly due to arrest of development; in the female, to excess of development, but with this class we are not now concerned. The true, which is again subdivided into two varieties, the "lateral" and the "transverse," has to do with the internal organs. In the lateral we find a strange admixture of the sexual types, while the genital organism on each side is antagonistic, male on one, female on the other. In the transverse, the female sexual type is found associated with the distinctive genital glands of the opposite sex. Our case belongs to the "lateral" sub-division, and Professor Simpson, in addition to many in the lower animals, has collected two or three very similar instances in the human subject.

In one, a young person about fourteen years of age, fallopian tubes, uterus and vagina existed, while on the right side there was a testis, on the left an ovary. The vagina and urethra terminated in a common constricted opening in the perinæum. The external organs were those of a hypospadic male. Strange to say, during life this case had always been looked upon as belonging to the male sex. Another, and still more remarkable case, is that of Marie Derrier, or Charles Doerge. This person was registered as a female, but at forty was persuaded to change his name and dress to those of a man. After death, however, fallopian tubes, uterus and vagina were discovered, with a testis on one side and an ovary on the other. From the description of the general configuration of the body, and of the disposition of both the external and internal generative parts, I am led to believe this case was exactly parallel to the present one.

Simpson has given us a full account of this malformation in a domestic fowl that he himself had an opportunity of examining, and I adduce it, simply because it assists us to take a correct view of lateral hermaphroditism. The fowl had all the appearance of being a cock, and until it commenced to lay eggs was considered to be so. On the right side, although no testis could be discovered, a well-developed vas deferens was found; on the left was a normal ovary and oviduct. The bird was never

known, however, to incubate ; but, on the other hand, crowed regularly, and often attempted to imitate the functions of the cock.

The present example of lateral hermaphroditism may be considered, then, to occupy a neutral position, as possessing in combination some of the characteristic attributes of both sexual types, although probably the feelings, if any existed, were slightly more in common with women than men. I think that the absent genital gland on the left side is an ovary and not a testis : the fact of the uterus lying much over to that side, and the presence of the parovarium in the broad ligament, tends to support this opinion ; for there can be no doubt but that in very early fœtal life a rudimentary genital gland appeared, but, development failing, it dwindled away.

Recollecting the natural development of the primitive embryonic structures, we can readily comprehend the several anatomical deviations in malformations of the sexual apparatus. We have, however, another element in true hermaphroditism to consider —an unseen, vital element—I mean that of the sexual types, which, as I shall point out, exist independently of the existence of distinctive genital glands, whether testes or ovaries. Let us, therefore, ascertain the normal relation of the sexual types to the individual. In the first place, it does not seem too hypothetical to infer that both sexual types co-exist in man and in every vertebrate animal, and that the evident sex is merely the prevailing type, the individual being born with the latent element or type of the opposite sex. We cannot suppose that it is a matter of chance or accident in the development of the embryo which type is to predominate, for we know that the genital system of the fœtus is at first of such a double character that it is as capable of being developed into the male as into the female organs ; it is, therefore, more reasonable to think that naturally one or other sexual type is destined to distinguish the life of the new being from the moment of fertilisation of the ovum, for no one can deny that the sex of the future bird is predetermined in the egg before incubation commences. From the well known fact of the dove tribe ordinarily laying but two

eggs, which almost invariably hatch a cock and hen bird, a "pigeon pair" has become a proverbial expression.

We will now see what evidence we can find in support of our theoretical inference that both sexual types co-exist in man, and in all vertebrate animals. It is found that some of the peculiarities of the latent or opposite type are sometimes evoluted, while at the same time many of the attributes of the individual's proper sex to a great extent disappear. We find this to be the case when the influence of the ovaria upon the system is lost, whether as the natural result of age, or from their removal by operation. Thus the effect upon a young woman,* whose ovaria formed hernial tumours at the inguinal rings, and in consequence of their incapacitating her from work were removed, was to cause suppression of the catamenia and atrophy of the mammary glands, while the body assumed a decidedly masculine type. So also in women who have passed the "change of life," that is to say, in whom the functional activity of the ovaria has ceased, we constantly remark a tendency towards the assumption of the attributes of the male type, as there is often an increase of hair upon the face, the voice becomes stronger and deeper toned, while the elegance of the female form is lost, and not unfrequently the mind exhibits a more deter- mined and masculine cast. A like change has been noticed after the cessation of reproductive life in the female deer, in which horns similar to those of the stag are then developed. But it is in birds, after they have ceased to lay, that the alteration of the type is most remarkable, for not only may the female acquire the variety of colour and the brilliancy of the male plumage, but even, as in the case of domestic fowls, the spurs, comb, and wattles of the cock, besides which she may even imitate the function of the male bird.

On the other hand, in the male sex, when the testes have been removed early in life, not only are the special characters of that sex not evoluted, but, on the contrary, the peculiarities of the latent female type come out. Thus, in the human species, if

* Pott's Surgical Works, quoted by Simpson.

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this loss has been sustained before puberty, the beard does not grow, the voice remains unchanged, and the mammary glands are so modified that they assume a resemblance to those of the opposite sex. Again, the assimilation to the female type is exemplified in the ox, and the approach to the female configuration under similar circumstances in our domestic animals is so well recognised as to require no further comment.

I think that these facts, taken collectively, are sufficient proof of the normal duality of the sexual types in the individual; and we may safely infer that when the natural ascendancy that one type should assume over the other fails to take place, lateral hermaphroditism is the consequence. Although the genital glands by their presence no doubt exercise an extraordinary influence on the sexual character, yet, strange to say, as we stated at page 47, the apparent sexual type is sometimes found at variance with the existing genital glands, so generally regarded as distinctive. Examples of these anomalous malformations belong to the "transverse" subdivision of hermaphroditism. The subjects of the "transverse" variety possess the female configuration and sexual type, while internally the ovaries are replaced by testes. The most common example of this irregularity is that of the free-martin cow, where we have, to all appearance, a heifer—that is to say, the female type—while internally an imperfect vagina and bicornuated uterus are found associated with testes and vasa deferentia.

In the human subject the case of Maria Arsano* is probably a perfect analogue to the free-martin cow. This person died at the age of eighty, after having passed through life as a female, and having been married as such; yet after her death, although "the external organs of generation were those of a female in their natural or normal state," it was found that the vagina was short, and terminated in a *cul-de-sac*, and that the uterus was absent, while testes and vasa deferentia replaced the ovaria and fallopian tubes. Two other instances in the human female have come to my knowledge, in which the female sexual type was obvious, notwith-

* *Vide* Simpson, in Todd's *Cyclopædia of Anatomy and Physiology*.

standing that true testes supplied the place of ovaries; in both these cases the vagina and uterus were imperfectly developed.*

I would observe that the converse of this anomaly, namely, the male type associated with the female genital glands, most probably has never been met with; for it would assuredly have been discovered in the lower animals if it were liable to occur.

But there yet remains for me to mention, although not included among genuine hermaphrodites, (meaning by such, cases where either both sexual types co-exist, or cases in which the general female type is found in conjunction with male genital glands,) a form of malformation which may happen in the male subject, where, in addition to the proper organism of that sex, a more or less perfectly developed vagina, uterus and fallopian tubes may be found. When we remember that in early intra-uterine life, the Müllerian ducts only attain their full development in the female, while in the male they cease to grow and are lost, except at the sinus pocularis, which represents the lower extremity of the conjoined ducts, and corresponds to the vagina and uterus of the female, we have no difficulty in understanding the possibility of this anomaly occurring. It is probable that such cases have their origin in some faulty innervation of the sexual organism at an early period of fœtal life, whereby these ducts, instead of ceasing to grow, have gone on developing. Examples are recorded of the superaddition of a more or less perfect vagina and uterus, in several of the male lower animals. In the human subject we have an instance in the case of a soldier,* twenty-two years of age, who died of his wounds, in whom the male genital organs were complete, except that the testes were undescended, while fallopian tubes, uterus and vagina were also present. The man Valmont,† is most probably another example of this malformation; he was married as a man, but on examination after death it was found that the testes (?) were retained in the abdominal cavity, and that fallopian tubes, uterus and vagina, which latter opened into the membranous portion of the urethra,

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* One of the instances had been a prostitute.
† Quoted by Simpson, in the article referred to.

existed.   In both these instances of this malformation in the human subject, one circumstance is present, which seems to justify our referring the origin of the anomaly to faulty innervation of the sexual system in the fœtal state, namely, that the male genital organs were more or less defective in development, seeing that the testes were undescended.

I trust that these remarks will help to clear away some of the difficulties connected with a subject of so much interest as the development of the genital system.   The specimen that has suggested this paper may be seen in the Museum of the School of Medicine, together with photographs of the external generative organs, taken shortly after death.

ANATOMICAL PECULIARITIES OBSERVED DURING THE WINTER SESSION, 1866 – 67.

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It is not intended in this paper, which must necessarily be brief, to describe every deviation from the normal arrangement which may have existed in the subjects received for dissection, but merely to give an outline of the most remarkable of those which came under my notice. With regard to some abnormalties, their frequency has been carefully observed and noted, but, for various reasons, this has not been practicable in the case of all. One of these reasons is that the supply of bodies was considerably in excess of the demand, thirty-one subjects having been sent into the dissecting-room, and it was therefore impossible to get all the parts properly and thoroughly dissected. In future, however, it is hoped that, through the aid afforded by an increased number of students, and the appointment of a second demonstrator, no deviation shall escape notice, or fail to be recorded.

I propose to describe the peculiarities under the several heads of 1. *Muscular*. 2. *Vascular*. 3. *Nervous*.

1. *Muscular*.—These were principally observed in connection with the front of the chest, and the upper extremity, where deviations seem to be of more frequent occurrence than in other parts.

Supra-costal.—The muscle so named by Mr. Wood, which is situated underneath the pectoralis major, and over the ribs, was only found in one subject. It was present on both sides, but was larger on the left than the right side, being respectively about $1\frac{1}{2}$ and 1 inch wide. It passed from the first rib, at the junction

of the bone and cartilage, to the upper border and anterior surface of the fourth rib, giving slips to the intervening ribs in its course.

Musculus sternalis.—This muscle was also only observed in one body. It existed only on the right side, and was associated with a very extensive origin of the pectoralis major. It is usually described as arising below, and having its insertion above, but it certainly appeared to me that its upper attachment was the more fixed. It was attached above, where it was very narrow, to the second costal cartilage and contiguous portion of the sternum, and passed in a curved direction, and becoming considerably wider, to the aponeurosis of the external oblique muscle of the abdomen. Both its extremities were tendinous, but the intervening part was entirely muscular.

Pectoralis Minor.—The origin of this muscle was unusually extensive in one subject, having been attached to the first five ribs on the left side, and from the second to the fifth on the right. None of those unusual insertions of this muscle which have been described were observed, though frequently looked for.

Biceps.—A third head of origin existed in connection with this muscle on three occasions. In each case it was only on one side, twice on the right, and once on the left. The extent of its attachment varied; in two examples it was about an inch wide, and placed just outside the insertion of the coraco-brachialis, with which it seemed partially blended, as well as with the brachialis anticus; in the other subject it was two inches wide, and partly connected with the internal intermuscular septum. In no instance was a fourth head seen. On one occasion this muscle sent a tendinous slip over the brachial artery, to be inserted into the inner condyle of the humerus.

Palmaris longus.—In the subject which had the supra-costal muscles, the palmaris longus was absent on both sides, while the palmaris brevis was very well developed. A kind of second *palmaris longus* was observed on one occasion, placed outside it, arising from the common tendon, and ending below in the fascia at the front of the wrist. It was a good sized muscle, and was found on both sides.

The slip which passes from the coronoid process of the ulnar

to the *flexor longus pollicis* was sometimes absent, while on the other hand it was very large in some cases, and once passed on to the internal condyle of the humerus, to which it had a firm attachment.

The muscular system of the lower extremity was particularly uniform, and free from any marked peculiarity, with the exception that an unusual slip in one case presented itself in connection with the extensor brevis digitorum, arising from the os calcis, and passing forward to have a distinct insertion into the inner side of the base of the first phalanx of the second toe.

I may add that I carefully noticed the number of times the psoas parvus was present, and found it in six out of the thirty-one bodies, making an average of about one in five. It was in each instance present on both sides.

2. *Vascular.*—It will be best to notice the peculiarities in this system according as they affect the several regions of the body.

a. Head and neck.—The place of division of the common carotid artery was singularly uniform, being in all the subjects about the usual spot, viz., opposite the upper border of the thyroid cartilage, and therefore the relative lengths of this vessel and the external and internal carotids did not present any variation that would be practically important. With regard to branches, the common carotid artery gave origin to the superior thyroid twice, and in another instance a third or middle thyroid artery arose from it. The facial and lingual arteries came off together in one subject, forming a rather large trunk, which, after a short course, divided into the two vessels above named.

The *subclavian artery* varied in some degree, as it usually does, in the height of its arch, but no great extreme was observed in this respect. Its branches presented many and frequent peculiarities, the principal of which were the following—

Separate origin of the inferior thyroid.

Posterior scapular arising separately from the third part of the subclavian (very common).

Two suprascapular branches, a small one from the thyroid axis, and a larger one from the third part of the subclavian, afterwards uniting to form one trunk; the posterior scapular coming off as usual from the transverse cervical.

A single branch, dividing immediately into superficial cervix, posterior scapular, and supra-scapular, the inferior thyroid being separate.

The transverse cervical giving off the ascending cervical.

b. Upper extremity.—The thoracic branches of the *axillary artery* were subject to considerable variation in number and arrangement. This vessel gave origin in one subject to a large trunk, which afterwards divided into anterior and posterior circumflex, subscapular, and superior profunda branches. There were three examples of high division of the *brachial artery*, or, rather, what appeared to be a high origin of the radial. In two of these it was only on the right side, but in the other on both sides. It took place at about the junction of the middle with the upper third of the arm. In each case the radial arose from the inner side of the brachial trunk, and then wound over the continuation of it, to get to its outer side. It took a very superficial course in one instance, being only covered by the skin and fascia above, and, in addition, the bicipital fascia lower down. The basilic and median basilic veins were placed immediately over it, and had the latter been opened, there would have been great danger of wounding the artery. It was also very near the surface in the fore-arm, being close beneath the skin, and not at all overlapped by the muscle. Its relation to the median nerve varied. In two instances the artery lay over the nerve, crossing it once or twice, but in the third example the cords forming the nerve united low down, and surrounded the artery, the trunk afterwards lying over it for some distance. The vessel remaining after the giving off of the radial took the usual course, and gave origin to the ordinary branches of the brachial, being afterwards continued into the fore-arm as the ulnar. There was a bony and tendinous arch in connection with the front of the humerus, towards its lower end, in one subject, through which the brachial artery and median nerve

passed. Only one example was noticed in which the median nerve passed underneath instead of over the brachial artery.

The *radial artery*, in one instance divided about two inches above the wrist into two branches, one being the *superficial volar*, which was the larger, and which passed over the muscles of the thumb, being, therefore, very near the surface, to join the superficial palmar arch, to the formation of which it contributed rather more than the ulnar. Before joining the ulnar, it gave off digital branches to the thumb, fore-finger, and half the middle finger. The other branch took the ordinary course of the radial artery to the back of the wrist, and afterwards entered the palm to form the deep palmar arch, not giving, however, its usual branches to the thumb and fore-finger.

The superficial veins of the fore-arm were arranged in very different ways, but the only variety calling for special notice was the following:—The median vein was absent, but there was a very large radial, which divided into median cephalic and median basilic, the latter being afterwards joined by the deep median and the ulnar, to form the basilic.

c. Trunk.—No very remarkable peculiarity was observed in regard to the arch of the aorta, either as to its direction, height, or the arrangement and number of its branches. The abdominal aorta divided in three subjects opposite the upper border of the fourth lumbar vertebra. The length of the common iliacs in these instances varied; in one, they were very short, being only about an inch long, and dividing above the fifth lumbar vertebra; in another, the left iliac measured $2\frac{1}{2}$ inches, but the right only $1\frac{1}{4}$ inch; while in the third example, the left measured $3\frac{1}{2}$ inches, and the right 3 inches.

The only deviations noticed in the branches of the abdominal aorta, were the separate origin of the hepatic artery, and the presence of two renal branches. The latter existed in one case in connection with a horse-shoe kidney (to be described hereafter), and here there were two vessels on each side, making four altogether. In another subject the second artery was only present on the right side. In each instance the abnormal vessel was of

considerable size, and was the last branch of the aorta, coming off from its anterior part, just above its bifurcation.

The following peculiarities of the branches usually arising from the internal and external iliac were noted :—

The origin of the obturator artery from the epigastric.

The same artery formed by two branches, one from the epigastric and the other from a trunk common to it and the pudic.

All the branches of the internal iliac coming off from its posterior division, except the pudic and sciatic.

In one instance, the gluteal artery arose from the *femoral*, and passed upwards and outwards, first over the psoas and iliacus, and then underneath the tensor fasciæ femoris, which it supplied, to be distributed to the gluteal muscles.

The remains of the hypogastric artery was unobliterated for a considerable distance in one subject.

The epigastric and circumflex iliac arose not uncommonly from the *femoral*, in one case three-quarters of an inch below Poupart's ligament, this peculiarity occurring on both sides. These vessels were always opposite one another, so that whenever one moved towards the femoral the other followed it.

There was one example of the circumflex iliac arising from the external circumflex artery of the thigh, which came from the femoral high up.

d. Lower extremity.—The only peculiarities worth recording in this part were in connection with the femoral artery and its branches.

The distance of the origin of the profunda from Poupart's ligament varied within the usual limits, but in one instance it came off $3\frac{1}{2}$ inches below that line ; this was on the right side, the left being only $2\frac{1}{2}$ inches below. This was the greatest extreme noticed in that direction, but it more than once arose close to Poupart's ligament.

The external and internal circumflex originated not unfrequently from the femoral trunk, sometimes one, sometimes both, the external presented this peculiarity most frequently, and in one instance gave off the circumflex iliac, as before mentioned.

There was one example of the external circumflex arising on both sides in common with the profunda, about an inch from Poupart's ligament, and another in which both circumflex came off in this manner, the internal then crossing the pectineus superficially, and dipping down between it and the adductor longus to get to the upper border of the adductor brevis, afterwards taking its usual course.

With regard to the venous system of this part; the only abnormalty noticed was the continuation of the popliteal vein along the back of the thigh, instead of passing through the adductor magnus with the artery; towards the upper part of the thigh it perforated the adductor muscles, and then joined the profunda vein to form the femoral.

3. *Nervous.*—The principal deviations occurring in this system were in connection with some of the branches of the brachial plexus. The two parts entering into the formation of the median nerve occasionally united very low down, sometimes even near the elbow, so that there were two nerves accompanying the brachial artery. In one instance, associated with the above peculiarity, and a high division of the brachial artery, the musculo-cutaneous nerve was absent, the median supplying the muscles on the front of the arm, and afterwards giving off a cutaneous nerve for the fore-arm.

In another subject, the musculo-cutaneous came off from the median low down, and passed along, and then underneath, the biceps, not perforating the coraco-brachialis.

The following arrangement came under notice three times :— The outer branch to the median was very small, but after the musculo-cutaneous had perforated the coraco-brachialis, it gave off a large branch, which went to join the median, thus enlarging it to its usual size.

The phrenic nerve arose entirely from the fifth cervical nerve, and therefore from the brachial plexus, in two subjects.

In the lower extremity, what was particularly noticed was the variation in the nervous supply of the toes, on their dorsal aspect. The external saphenous nerve was several times un-

usually large, and supplied the two outer toes, and half the next ; along with this, in one body the remaining toes were supplied as follows : — the great toe and half the next by the musculo-cutaneous, and the remainder by the anterior tibial, thus completely altering the usual mode of distribution. The musculo-cutaneous nerve occasionally took the place of the anterior tibial, supplying, in addition to the usual number of toes, the contiguous sides of the great toe and the next.

The external cutaneous nerve of the thigh was absent in one subject, the genito-crural taking its place.

Before concluding this paper, I will add a brief description of a horse-shoe kidney which was met with in one of the subjects.

The union between the two kidneys was, as is usually the case, at the lower end, and was complete, the cortical substance of one side being continuous with that of the other. The uniting part crossed the aorta just over its bifurcation, and the inferior mesenteric artery passed down in front of it, producing a well-marked groove. The combined viscera weighed $8\frac{1}{4}$ oz., the left portion appearing rather the larger, and extending a little higher than the right. The position of the ureters was very unusual; instead of passing down behind, as they commonly do in specimens of this kind, they came forward, and then curved downwards over the upper concave border of the united kidneys, to get to the pelvis. As before mentioned, there were two renal arteries on each side. The spermatic arteries had a long course, especially that of the left side, curving round the kidneys, and appearing to be pushed aside by them.

SIX CASES OF PRIMARY AMPUTATION AT THE SHOULDER-JOINT.

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In the following series are comprised all the primary amputations at the shoulder joint I have had to perform at the Northern Hospital. I shall relate the cases, with short remarks on each, and then add a few general observations on primary amputation.

CASE No. 1.—William Myers, aged 36, a carter, was admitted on June 16th, 1864. He stated he had been bitten, and afterwards got down and kicked, by a horse he had charge of. The right humerus was fractured in its upper third, and there was an extensive lacerated wound on the front of the arm and another at the back; through these wounds the hand could be passed freely down to the fractured surface of the upper end of the humerus, and also up into the axilla, into which the broken end of the lower portion of the bone had been drawn up. The bone was not much comminuted, the elbow and forearm were a good deal crushed. There was a large contusion over the right scapula and the right side of the chest, and fracture of the ribs was suspected. There was a good deal of collapse. At 10.30 p.m. I amputated at the shoulder-joint. There was barely sound skin enough to cover the wound. Three arteries were secured with ligatures, and a vein that bled with an acupressure needle and wire. He had had thirty drops of laudanum on admission, ordered brandy to be given freely in the night, and no more opium. 17th, 11 a.m. he is heavy, and has slept a good deal, breathing much oppressed, mucous râles, pupils rather contracted, emphysema has appeared on the right side and extends upward on the neck, pulse 120, tongue dry and furred, some delirium,

he has passed water.   To have half an ounce of brandy every two hours, ice and lemonade; with a mixture containing carbonate of ammonia and sulphuric ether every second hour.   A large strengthening plaster was applied over the ribs on the right side. 9 p.m., much the same, but not delirious.   18th.   The emphysema has extended to the left side of the chest, breathing still much oppressed, tongue more moist, pulse 120, stump looking well, free discharge of serum, no sloughing; dressed with wet lint.   To have a castor oil injection.   At 3 p.m., he took rather a large quantity of beef tea at one time; about 5 p.m., he was seized with a violent pain in the right side, pulse 134, respiration 56.   Hot fomentations were ordered, and an ounce of brandy every hour. 9 p.m., pain less severe, pulse 120, sharp and hard, face flushed, skin hot, his bowels have been moved; ordered a grain of opium every four hours, and an ounce of brandy every two hours, beef tea in small quantities, turpentine applications to the side, and a poultice to the stump.   20th, noon, he is decidedly better, pulse 108, tongue very much furred, respiration 40, skin cooler and moist, he has slept a little, stump rather sloughy, and lower flap much inflamed.   9 p.m., seems still improving, has taken a little bread and milk.   21st, noon, pulse 108, rather weak, tongue dry and brown, breathing still oppressed, and mucous râles present, friction sound distinctly audible on the right side, face congested, neck still rather emphysematous, slight delirium, passes water freely.   To omit the opium, and take again the ammonia and ether; a small blister to be applied to the right side; to take half a grain of morphia at night.

22nd.—Pulse 120, respiration 44, breathing easier, and respiratory murmur more natural; he is delirious, skin hot, tongue dry and brown, he has not slept well, ordered one ounce of brandy every hour.

23rd.—11 a.m., pulse 132, respiration 32, tongue brown and dry, has slept badly, stump discharging freely, appetite better. In the evening he seemed still a little better, but about 3 a.m., on the 24th, eight days after the operation, the stump began to bleed, and before this was found out a very large quantity of blood was lost, and he died about a quarter of an hour after the house

surgeon had been summoned to him. No post-mortem ex-amination was permitted, but it was ascertained that there was fracture of one or more of the ribs on the right side.

I have recorded this case pretty fully, because the attack of emphysema and acute pleurisy connected with the fractured rib had, I think, much to do with the fatal termination. The oppression of the breathing, and the bronchial effusion from the first, seemed to make the free use of stimulants necessary, and their administration tended in my opinion to produce the sloughy state of the stump, and so led to the secondary hæmorrhage. The case was very disappointing, as the man seemed almost to have got safely through the severe pleuritic complication.

In the treatment of secondary hæmorrhage occurring some days after operation, we have now adopted at the Northern Hospital the free application of the actual cautery, and I have seen it used in several cases with the very best effects. It not only effectually arrests hæmorrhage, but where there is a sloughy wound it pro-duces a complete change of action, and its use is often followed by the appearance of a healthy granulating surface. Care must be taken, when large linseed meal poultices are applied in order to promote suppuration in a stump (and I shall refer by and by to their value), that they be not applied too hot, lest they provoke bleeding. Care must also be taken, of course, in changing poultices, that a ligature be not accidentally put on the stretch. The ends of the ligatures should, if possible, be kept looped up by a strip of plaster to the side of the stump, and when they are being thus arranged after an operation, they should be laid on the skin in a loose wavy manner, not stretched straight, lest the swelling of the stump that almost always occurs should cause them to make traction on the vessels.

Case No. 2—Francis Ryley, aged 4, was admitted on June 22nd, 1864, with his right arm crushed by the wheel of a lorry. It was completely shattered almost up to the joint, and denuded of skin. A circular flap of skin, just enough to form a covering after amputation, was left, and looked pretty sound, but was a good deal detached from the muscles beneath it, which were much injured. The face and forehead were contused and swollen, and

there was a severe contused wound of the right thigh. At 8 p.m., I removed the limb at the shoulder joint, making a covering entirely of skin. The axillary artery was secured by a long acupressure needle passed through the integuments, and a little tape passed over its ends. Three little vessels were secured with small needles on the face of the wound, with looped wire passed over their points and twisted round their hafts. The flaps were brought together with sutures, and no dressing was used. As the boy was a good deal collapsed, a tea-spoonful of brandy every two hours was given.

23rd.—10 a.m., he is going on well, has slept a little, lungs rather loaded. At 5 p.m. on the 23rd he was seized with general convulsions, which continued with intermissions until 7 p.m., when I saw him, and found him still labouring under them. As the stump looked rather tense, I removed the sutures, and also the small needles, twenty-three hours after insertion, and took off the tape from the large one. While I was in the act of doing this, the convulsions seemed to be aggravated. Five minims of laudanum were given, and in an hour's time, as the convulsions were still going on, three minims more.

24th.—He has dozed a good deal in the night, the convulsions have ceased, he is unconscious, and has not spoken. He was ordered four drops of laudanum, and to have milk and lemonade, and no brandy.

25th.—10 a.m., he has had a restless night, pulse 160, small and weak, he is quite conscious, outer angle of wound sloughy, the contused portion of the thigh is beginning to slough, and a portion of exposed fascia, that seemed very tense, was freely divided. Opium draught repeated. To have a tea-spoonful of wine every half-hour. 12.15 p.m., tongue white, he seems improving. I removed the large needle sixty-four hours after its insertion.

26th.—Pulse 148, stronger; breathing a good deal oppressed, stump discharging freely. From this time he improved daily, the wound granulated and slowly healed over, and he made a good recovery, and was discharged cured on Sept. 21st, 1864.

The occurrence of convulsions and the use of acupressure in this case are the points of interest. The convulsions began about

twenty hours after the operation, at a time, then, when reaction would be beginning to set in; and they may have simply marked the accession of re-actionary fever, as we see convulsions ushering in measles or scarlatina in children, and marking the time when the system re-acts, after the shock, as it were, caused by the morbid poison. Or, as the face and head were bruised and swollen, there may have been active congestion of the brain coming on as reaction set in, and causing convulsions. Lastly, the convulsions may have been solely due to the reflex irritation from the stump, which was becoming a little tense, and also perhaps from the points of the small needles. I think probably all these causes had something to do with the attack of convulsions. The fits were certainly much aggravated while I was handling the stump and removing the small needles, not always a very easy matter. Acting on the belief that reflex irritation had much to do with the convulsions, I gave laudanum in doses I consider large for so young a child; nor was I deterred from persevering by the child's becoming unconscious, so long as I found the convulsions kept away.

About the date of this operation, I used acupressure in several cases. An amputation of the thigh for traumatic disease made a good recovery; a long needle was used to compress the femoral artery, and was removed in seventy-two hours. In an amputation at the knee-joint for malignant disease of the tibia, the popliteal artery was secured with a long needle, and a tape over its ends; bleeding came on before the patient left the table, and I substituted a small needle and wire for the long one; bleeding came on again after she was taken to her bed, and I had to open up the wound and use a ligature. This was the only case of hæmorrhage I had, and it would not have discouraged me so much if I had not already found this method troublesome in other ways. In all the cases the small vessels were secured by a small needle, threaded with wire passed under them, and then a looped wire passed over its point and twisted round its haft. I had always some trouble, and in one or two cases very great difficulty, in withdrawing the small needles. In no case did immediate union take place.

Improvements have been made in acupressure since I tried

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it; and Professor Pirrie, who is very enthusiastic about it, gives the preference to a mode of securing small vessels in which a long needle is used, whose point is passed through the tissues close to the mouth of the vessel; the handle of the needle is then to be rotated on the face of the stump to the extent of a quarter of a circle, and the point is to be pushed forward so as to be fixed in the tissue beyond the vessel; so that the vessel seems to be twisted and compressed at the same time.

I must confess that I did not find acupressure nearly so easy in execution as deligation. To a person whose sight is pretty good, nothing can be much easier than to seize a vessel's mouth and tie it. Whereas to pass a needle under the course of a little vessel is not easy, when you only see the mouth and cannot be sure what that course is. The neat drawings Professor Pirrie has made, showing round isolated orifices on a smooth surface, give very little idea of the quivering, twitching wound after an amputation. Acupressure has this great advantage, that it permits all foreign bodies to be removed from the stump in a much shorter time than is the case after deligation. On the other hand, it seems to me tedious and troublesome to perform; it does not compress the vessel alone, but often nerves, and a mass of tissue also; it leaves for a short time a number of needle points, that must irritate the sensitive and often twitching surfaces. When the needles with looped wire are used, they are often very difficult to withdraw; and in one case of amputation of the leg that terminated fatally, in an extremely irritable patient, I was not able to get the needles away at all, without more violence than I was willing to use.

I was very sanguine about acupressure when I began to use it, and I should now be glad to watch its use in the hands of others, and to adopt it again if I saw them successful; otherwise I shall be content in general with the use of the ligature. My then colleagues, who patiently assisted me in making trial of acupressure, have none of them adopted this method.* Professor Pirrie describes at length seven different modes of using acu-

* Since the above was written, Mr. Hakes informs me that he is giving acupressure a trial at the Royal Infirmary.

pressure, and as the procedure is still in its infancy we may hope for many more.

CASE No. 3.—William Dooley, aged 10, was admitted on September 12th, 1865, with his right arm extensively crushed by a railway waggon going over it. I removed the limb at the shoulder-joint at 10 p.m.; I was able to make a large flap from the deltoid. Ligatures were used to the vessels. The case went on well without any noteworthy occurrence, and the boy was discharged cured on October 27th, 1865.

CASE No. 4.

CASE No. 4.—George Lloyd, aged 13, was admitted on March 11th, 1867, with his right arm torn off by machinery within three or four inches of the shoulder-joint; the skin was stripped off still higher. The boy was much collapsed. Chloroform was given, and I disarticulated the head of the humerus, and then sawed off a considerable portion of the acromion process. I removed all the muscular tissue I could, but still found I could not nearly draw the skin together to cover the glenoid cavity. I therefore made a long incision from the circular wound down the back of the scapula, and another in the front of the chest,

and detached the skin freely on either side of the incisions from the parts beneath. By this means I was able to make a covering. Ligatures were used. Before the operation was over the boy nearly sank; a little brandy was given him after he had been taken back to his bed, and he slowly rallied.

March 12th.—He has slept well, and has not much pain; pulse, 128; tongue moist; to omit brandy; to have tea, lemonade, and milk. 9 p.m. Is rather restless and rambling; pulse, 124. To have a quarter of a grain of morphia.

13th.—Tongue foul; pulse, 120; bowels confined; the stump looking well. To have two grains of calomel with five of rhubarb immediately.

14th.—After a castor-oil injection, his bowels were moved four times. He feels better, and has slept well. He was ordered ice and four ounces of wine daily. In the evening a troublesome cough came on.

From this time he improved in health, but the wound got into a sloughy state, and ultimately nearly the whole of the skin flaps sloughed, and a very large granulating surface was left. The ligatures all came away by the 25th.

I had gained nothing, perhaps rather lost, by dissecting up flaps of skin, as the surrounding skin was less moveable and elastic than it otherwise might have been. I thought at one time I might have to perform some plastic operation, to cover the large surface, as the skin around seemed so tense, and the new borders of skin had to climb, as it were, over the edges of the prominence of the shoulder, with the further disadvantage of the granulations being quite adherent to the glenoid cavity and the portion that was left of the acromion process. However, after a long and tedious convalescence, the boy is now nearly well; only one little patch on the top of the shoulder remains unhealed, and this is gradually contracting, while the skin round about is now lax enough. Once or twice the wound has been as nearly healed as possible, and with some slight derangement of health the ulcerative process has set in, and undone the work of weeks. He was made an out-patient on September 21st, 1867.

CASE No. 5.

CASE No. 5.—Alfred Matthews, aged 24, engine-driver, was admitted on April 6th, 1867, with his right arm crushed by a railway waggon. Amputation at the shoulder-joint was performed the same day. There was plenty of sound integument on the outside, and a large flap was formed from the deltoid. Ligatures were used. There was not much collapse. No stimulants were given, but tea, milk, and a little beef tea ordered. He was a strong, healthy man.

7th.—He has had a good night; pulse, 116; tongue pretty clean, and moist. The stump is looking well. Two sutures were removed to allow of a little sanious discharge.

8th.—He is doing well, but has rather a troublesome cough. The patient now went on extremely well. He was allowed meat dinner and half a pint of porter on the 12th. A great part of the wound united by the first intention, and it was entirely healed on June 17th, when he was discharged.

In this case there was very little constitutional disturbance. The roundness and fulness of the shoulder were well preserved, although the deltoid had wasted a good deal. The difference in appearance between his full shoulder and what may be called the complete want of shoulder (shown in the photographs of the cases in which the acromion was removed), was very striking. The three patients happened all to be in the hospital at the same time.*

* The photographs were all taken about the middle of September.

CASE No. 6.
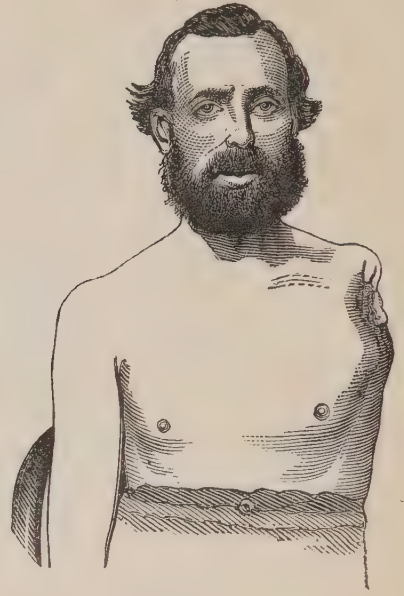
CASE No. 6.

CASE No. 6.—Peter Hellewell, a foreman miller, aged 36, was admitted on April 24th, 1867, with his left arm nearly torn off near the shoulder-joint, by the strap of an engine in a flour mill. There was no bleeding, and he was so extremely collapsed that our house-surgeon did not expect him to live from hour to hour, and did not think there was any use in sending out the usual consultation notes. The man was perfectly unconscious, cold, and nearly pulseless. Warmth was applied and stimulants were given, and he slowly revived, but on the 25th was still quite unconscious. On the 25th, at 1 p.m., I found him still perfectly unconscious, but he had a tangible pulse. The humerus was broken at the upper part of the middle third; the skin was destroyed on the outer part of the arm almost up to the acromion, and the bruised and lacerated muscles exposed. There was a strip of sound skin down the inner side of the arm about six inches in length. Although the man's condition was unpromising, my colleagues agreed with me as to the necessity for removing the limb. A little chloroform was given (and very little was required, he had so little sensibility), and I removed the arm at the joint, taking away the fleshy mass of the deltoid,

and removing the greater part of the acromion process. I saved all the skin I could from the inner side of the arm, and was just able to get a covering for the joint. Ligatures were used to the arteries, and the axillary vein, which bled a little, was also tied. He was removed to his ward in a very precarious state, and brandy was administered. 9 p.m. Pulse 130; he is still quite unconscious; his urine has to be drawn off. Ordered beef juice and eight ounces of brandy.

26th.—To-day he is a little more conscious; takes his brandy and beef juice well; he begins to cough a good deal.

27th.—He is improving as far as consciousness is concerned, but is hot and feverish; tongue white; he talks a good deal; he can pass his urine. The flap of skin is all sloughing, but there is not much inflammatory action around the part. A poultice was applied. Ordered ice, lemonade, &c., and to stop the brandy. To take three grains of calomel with eight of rhubarb.

28th.—He is quite conscious, but in rather an excited state, though not delirious. He told me he had just discovered he had lost his arm. He had found it out in an unusual way, for he had reached down his card from the head of the bed, and had read " amputation at the shoulder." The poor man seemed more pleased at his own acuteness in making the discovery than distressed at losing a limb. The wound is beginning to suppurate freely. His tongue is rather cleaner; pulse about 120. In a day or two this mental excitement passed off. His cough now became most troublesome, and he had to have opiates given freely to relieve it. He states that he often suffers a great deal from bronchitis. His state was very precarious for a long time. I was obliged soon to revert to the brandy, and to give it whilst profuse suppuration was going on in very large quantities, as much as sixteen to twenty ounces in the day. The granulations that formed were pale and flabby, and the wound, which was of considerable size, showed little disposition to heal. After a few weeks I had him removed upstairs, out of the general ward into a large airy room, which he had to himself. This room, which is only occasionally used for patients, has a large skylight, as well as windows looking over the river, and is bright and

cheerful. The effects of the change were very marked. He began to have colour in his cheeks; the granulations became red, and the wound began to heal. He was discharged with the wound nearly healed on July 22nd, 1867.

I saw him a week ago. He is very well, and gaining flesh. The wound is healed except in one puckered corner, where there is a little spot not yet cicatrised. The parts about the cicatrix are tender, and he says he cannot bear the shaking of the flour mill yet. The cicatrix is very small, as the surrounding skin was lax, and permitted itself readily to be drawn together.

In this case the main feature was the profound shock. I have no doubt there was considerable effusion of blood, perhaps in the form of ecchymosis, within the cranium, and there was, as might be expected, a good deal of cerebral excitement when reaction set in. Mr. Prescott Hewitt's remarks, in Holmes's Surgery, on the frequent, if not universal, extravasation of blood in the head in cases of shock, are very interesting. We no longer need always puzzle ourselves to decide whether a case is one of concussion or compression, for the two phenomena are, as in this case, often interwoven.

Amputation at the shoulder-joint has been, as far as my individual experience goes, more successful than any of the other great amputations. Only one of the six cases proved fatal, whereas three primary amputations of the thigh I have had have all ended fatally. In fifteen primary amputations of the leg immediately below the knee, I have lost five cases, a mortality of about 33 per cent.

The occurrence of troublesome cough in all the cases of amputation at the shoulder is probably due to some reflex irritation.

I generally apply no bandage after an operation; the edges of the wound are brought together with sutures, and then a little cotton wadding is laid loosely on the face of the stump. After primary amputations in general the striking feature that presents itself is the high inflammatory reaction that follows the double shock the system has received. We have almost invariably, about the second or third day, a hot skin, a rapid pulse,

great thirst, a white dry tongue, generally delirium, and a swollen state of the stump.

In Surgery, most undoubtedly, and I believe it to be the same in the more hidden paths of Medicine, high inflammatory action must be met at first by lowering remedies. If we give alcoholic stimuli when the phenomena I have described are present, in all probability the inflammatory action in the stump will extend up the limb, and traumatic gangrene or extensive sloughing result; probably great delirium will set in, and end in death by coma. The opposite treatment must be pursued, unless the patient be habitually very intemperate. He must be put on strictly low diet, sometimes limited to tea and a little bread for a day or two, excluding even beef-tea. I generally give a dose of calomel with either rhubarb or jalap.

All tension must be removed from the stump, and if there is much redness, or any tendency to sloughing, a soft large linseed meal poultice should be applied early, and free incisions must be made if necessary. Under this treatment the high fever generally soon subsides. The good effects of large poultices in bringing on healthy suppuration are very marked. I have several times seen the character of the tongue change, and lose all its dangerous significance, within a few hours of the first use of this soothing appliance.

Opiates in this stage must be given with great caution.

When once free suppuration is established, the time soon comes when we must give stimulants with a most liberal hand; the stomach is often too weak to bear much solid food, or even much beef tea, and we shall find it necessary to give large quantities of wine and brandy and ale or porter, perhaps for weeks. If this is not done, the patient will sink into a very low state, and will in all probability become the subject of pyæmia.

I must not conclude this report without acknowledging the very great care and attention devoted to the latter cases in this series by our house-surgeon, Mr. Bradley.

TABLE OF OPERATIONS PERFORMED AT THE LIVER-POOL ROYAL INFIRMARY, FROM AUGUST, 1866, TO AUGUST, 1867,

WITH REMARKS BY

CHAUNCY PUZEY, *House-Surgeon*.

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THIS paper has been written for the purpose of giving a general report of the surgical operative practice at the Liverpool Royal Infirmary, during the last twelve months.

In it I have endeavoured to show briefly for what injuries or diseases the principal operations have been performed, and what has been the cause of death in those cases which have terminated fatally. In a report of this kind, a history of cases could not be given, but I have made a few remarks on some of the most interesting, which I thought ought not to be altogether passed over; and as regards the deaths, I have simply given such an outline of the most prominent symptoms and post-mortem appearances as may be sufficient to show the cause of death. (In some instances even this is unnecessary.) In several cases, from different causes, no post-mortem examination could be made; and in others, only certain parts could be inspected.

I am fully aware that several important cases have been passed over with only a few remarks, though it must appear that they are deserving of much more careful observation; but as it is only a short time since it was proposed to me that this report should be written and published, I have found myself much more unprepared than I should otherwise have been.

It will have been observed that the operations at the Infirmary are performed more frequently for disease than for accident. All the casualty patients from the docks are taken to the Northern or Southern Hospitals. The most serious accidents admitted

come from the railways, many from the rope-works, and other manufactories in the eastern district of the town; but the number of primary amputations is comparatively small. In primary amputations, the nature of the injury must influence the surgeon in choosing the mode of performing the operation; but it is generally different in regard to operations for disease. For amputation of the thigh, Teale's method has been found the most satisfactory, or rather a modification of his operation, by cutting a very short posterior flap and a long anterior one. In amputation of the leg, the best stumps have been made by cutting lateral skin flaps, and completing the operation as in the circular method.

As regards the cases of excisions of joints and important bones, the result cannot, in many instances, be decidedly stated. It is generally, of course, for time to show how an operation of this nature has succeeded; and this is one reason why the operations have been arranged under the heads of 'recoveries' and 'deaths,' instead of under those of 'cured,' 'relieved,' and 'died.' The same observation will apply still more forcibly to the table of operations for cancerous diseases.

With these few remarks, I shall proceed to give a table of all the operations performed at the Infirmary from the end of August, 1866, to the end of August, 1867.

TABLE OF OPERATIONS.

Operation.		Recoveries.	Deaths.	Total.
Amputation—				
of Thigh . .	Primary	3	1	4
	Secondary, and for disease .	7	2	9
at Knee-joint	Primary	0	0	0
	Secondary, and for disease .	1	1	2
of Leg . .	Primary	2	1	3
	Secondary, and for disease .	7	0	7
of Foot . .	Primary	0	0	0
	Secondary, and for disease .	8	0	8
of Toes . .	. . . .	11	0	11
at Shoulder-joint . .	Primary	1	1	2
	Secondary, and for disease .	0	1	1
	Carried forward	40	7	47

			40	7	47
Brought forward			40	7	47

Amputation—

of Arm . .	Primary	0	0	0
	Secondary, and for disease .	1	1	2
of Fore-arm .	Primary . . . - . .	2	0	2
	Secondary, and for disease .	6	0	6
of Hand through metacarpus	Primary	2	0	2
of Thumb or Fingers		37	0	37

Excision—

of Shoulder-joint	1	0	1
of Elbow-joint	8	0	8
of Knee-joint	1	0	1
of Ankle-joint	2	0	2
of Os Calcis	2	0	2
of Shaft of Tibia	0	1	1

Herniotomy		2	3	5
Lithotomy		4	1	5
Tracheotomy		3	1	4
Trephining		0	2	2
Ligation of Arteries for	Aneurism . . .	4	1	5
	Wound	4	0	4
Excision of Cancer of	Breast	12	0	12
	Lip	12	0	12
	Tongue	1	0	1
	Other parts . . .	6	1	7
Excision of other Tumours		20	0	20
Ovariotomy		2	0	2
For Vesico-Vaginal Fistula		1	1	2
For ruptured Perineum		1	0	1
Ligation of Uterine Polypus		2	0	2
For ununited Fracture		1	0	1
For foreign body in Bladder		0	1	1
For Fistula in Ano		27	0	27

Carried forward	204	20	224

Brought forward . . .	204	20	224
For Harelip	5	0	5
For Hydrocele	13	0	13
Removal of diseased bone	13	0	13
Paracentesis Abdominis	8	0	8
Tenotomy	8	0	8
Forcible dilatation of Urethra	9	1	10
Various	47	2	49
Total	307	23	330

The diseases and injuries for which *Amputation* was performed were as follows : —

Primary amputation of the Thigh.—Four cases, all for railway crushes—one death.

Secondary amputation of the Thigh.

> 2 for disorganisation of knee-joint, after compound fracture of leg.
> 1 for suppuration of knee-joint, from traumatic synovitis.
> 3 for strumous disease of knee joint.
> 1 for extensive necrosis of femur.
> 1 for malignant disease of the lower end of femur.
> 1 for extensive destruction of the leg by a burn.

Total 9 cases, of which two died.

Amputation through Knee-joint.

> 1 for caries of tibia and disease of knee-joint. (In this case the condyles of femur were sawn through.)
> 1 for compound fracture into ankle-joint, followed by spreading traumatic gangrene.

Total 2 cases, of which one died.

Primary amputation of Leg.

> 1 for railway crush of foot, and laceration of leg.
> 2 for compound fracture of leg, with severe laceration.

Total 3 cases ; one death.

Secondary amputation of Leg.

>   1 for disease of knee-joint (anchylosis of patella with femur).
>   1 for caries of tibia,
>   1 for caries of tibia, and disease of ankle-joint.
>   1 for compound fracture of leg a week before.
>   1 for strumous disease of tarsus and ankle-joint.
>   2 for sloughing of flap after Syme's amputation.

Total 7 cases; no deaths.

Amputation of the Foot.

>   5 for disease of the ankle-joint.
>   2 for carious disease of the tarsus.
>   1 for malignant disease of the tarsus.

Total 8 cases; all recovered.

Of these, six were cases of amputation at the ankle-joint by Syme's method; one at the ankle-joint, with a long inner flap as recommended by the late Dr. Mackenzie, of Edinburgh; and one of Chopart's amputations.

In two of the cases of Syme's amputation, the heel flap sloughed. Both these patients were old women, who were much emaciated, and had very feeble circulation. In these two cases, amputation of the leg was subsequently performed, and the patients did well. One of the other patients, on whom this operation was performed for malignant disease, could rest the whole weight of his body on the stump, in less than four weeks.

Primary amputation of the Shoulder-joint.

>   Two cases, both for severe compound comminuted fracture of the upper part of the arm. (In each of these cases, there were fractured ribs, with emphysema, and in one of them, dislocation of the spine. This latter patient died.)

Amputation at Shoulder-joint for disease.

>   One case, for malignant disease of the arm. This case terminated fatally.

Amputation of the Arm for disease.

> 1 for traumatic gangrene of the arm.
> 1 for malignant disease of the fore-arm.
> ———

Total 2 cases; of which one died.

Primary amputation of the Fore-arm.

> 1 for machinery crush of hand and wrist.
> 1 for compound fracture of fore-arm, with severe laceration.
> ———

Total 2 cases; both recovered.

Secondary amputation of Fore-arm.

> 2 for compound fracture and laceration, with subsequent sloughing.
> 1 for disorganisation of wrist-joint, after punctured wound.
> 3 for strumous disease of wrist joint.
> ———

Total 6 cases; no deaths.

The following *Excisions* were performed :—

Of the Shoulder-joint.—One case. In this instance, the head of the bone, with a large portion of the upper part of the shaft of the humerus, was found almost detached, and was easily removed. The patient was 15 years of age. Result very satisfactory.

Of the Elbow-joint.—Eight cases. Four were for strumous disease, one for destruction of the joint after compound fracture of the olecranon process, one for anchylosis of the arm in the straight position, after comminuted fracture of the condyles of the humerus, three months before admission; and two were re-excisions, one after excision for disease, the other after excision for anchylosis of arm. Of these, five were cured, one went out relieved, and the others are in a fair way of soon having useful limbs. The ages of these patients ranged from 7 to 40 years. In two of these cases, the operation was performed by means of a single straight incision; in the others by the usual H incision.

Of the Knee-joint.—One case; a lad 17 years of age. Operation performed by an H incision. There was extensive disease

of tibia and femur, necessitating the removal of a large slice of bone from each. The patella was gouged, and left. The leg was put up at once on a straight back splint with foot piece, and kept steady by side splints. The patient is still in; but the case has progressed favourably, without any unpleasant symptoms ever since the operation, which was performed eleven weeks ago.

Of the Ankle-joint. — Two cases; of which one was for compound dislocation of the ankle-joint, in which case the astragalus, and articular surfaces of the tibia and fibula were removed after enlarging the wound, (which was on the inner side of the ankle,) upwards. The man left the Infirmary thirteen weeks after, with a good foot and leg, rapidly becoming strong. The other case was that of a lad, 15 years of age, suffering from extensive caries of the astragalus, and lower end of tibia and fibula. The whole of the astragalus, and a large slice of the tibia and fibula, was removed by means of one long incision on the outer side of the ankle, extending from about $2\frac{1}{2}$ inches above the external malleolus to the articulation between the astragalus and os calcis; from which incision another was made as far as the outer side of the tendo Achillis. After the operation there was considerable bleeding from the deep parts of the wound; the posterior tibial artery was therefore cut down upon, and tied behind the inner malleolus, and the hæmorrhage ceased. An anterior tin splint was then fitted to the foot and leg, and the limb swung.

The operation was performed twelve weeks ago, and the lad can move his toes freely, and swing his leg without pain. The foot is firmly fixed to the leg, and, with the exception of considerable thickening about the parts, (which, however, is decreasing,) the case seems likely to turn out favourably.

Of the Os Calcis. — Two cases; both for caries. One was that of a girl, 16 years of age. The bone was removed with considerable difficulty by means of one incision, extending from the calcaneo-cuboid articulation, across the back of the heel, to just behind the posterior tibial artery. The other was a lad, about the same age. In this case the same incision was made, together with one at right angles to the first, at the back of the heel, extending upwards to a little above the level of the astragalo-calcanean

articulation. By these incisions the bone was removed with much greater ease than in the first instance. In both cases the foot and leg were kept supported by a tin splint, applied to their anterior surface.

The girl went out twelve weeks after the operation, and when last seen (about four months ago) could walk almost as well as if she had a perfect foot. The other patient is still in, but now, eight weeks after the operation, is almost well.

Of the Shaft of the Tibia.—There was one case in which this operation was performed. It ended fatally. *(Vide* 'Deaths after Operations.')

Twelve cases of *Malignant Disease of the Breast* have been operated upon during the last year. Of these ten cases were of the scirrhous, and one of the encephaloid form. The nature of the other case has not been noted. In one case of scirrhus the disease returned about six months after operation. The whole of the cicatrix was affected by cancerous disease, and no further operation could be performed. The patient who was suffering from encephaloid disease, was, at the time of operation, about seven months advanced in pregnancy, and considerable care was required in removing every portion of the gland in consequence of the peculiar friability of the healthy parts, owing to her condition. She made a good recovery, without any unpleasant symptoms.

In many of these cases of excision of the breast, and also in some other operations, the plan of washing out the wound with a solution of chloride of zinc has been tried, as recommended by Mr. Campbell de Morgan. It has been found to cause considerable pain, and has been followed in several cases by erysipelas, but in most of the cases the discharge from the wound has been unusually free from offensive odour, and with one or two exceptions, which perhaps were hardly fair cases for trial, the patients so treated have done exceedingly well.

The cases of *Cancerous Disease of the Lip* do not call for any remark, but that of *Epithelioma of the Tongue* is worthy of notice. It occurred in a labourer, aged 47, and involved the lateral portion of the tongue near its base. On the 5th of February, Mr. Bickersteth divided the lower lip to below the chin, and sawed

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through the lower jaw in the median line. The two portions of jaw having been dragged apart by retractors, he divided the tongue into two lateral halves, and having severed that half in which the disease existed from its attachments to the floor of the mouth, divided the base close to the hyoid bone, by the wire-rope ecraseur. There was very little bleeding. The lower incisors were wired together, and the lip stitched up. Sixty-six hours after operation free bleeding came on from base of tongue. Cold failed to arrest it, and styptics could not well be applied. Mr. Bickersteth was sent for, and in the mean time the bleeding, which was very profuse, was stopped by plugging; small pieces of sponge, to which strings were attached, being pushed down to the bleeding part one after the other, till the side of the mouth whence the disease had been removed was filled, as far forward as the teeth; a long flat sponge was laid over these, so that, when the jaws were closed and bandaged together, the mouth was completely filled. Seventy-two hours after the first operation, Mr. Bickersteth cut down on the lingual artery of the right side, and tied it. The sponges were removed, and the bleeding was found to have ceased. Three days after, there was bleeding from the lingual artery wound, which was stopped by injecting perchloride of iron. A week after the ligation of the lingual artery, copious hæmorrhage again came on from the mouth, the patient became blanched, and almost pulseless; this was again stopped by plugging. A consultation having been held, it was resolved to try the effect of the plugging. The sponges were kept in for forty-eight hours, the patient being supported by stimulant and nutrient enemata. At the end of that time they were removed; there was no further bleeding, and the man made a good recovery, and left the hospital five weeks after. When last seen, about six months after the operation, the remains of the tongue occupied the median line of the mouth, the jaw was firmly united, the man was in good health, and could speak well, but there was some suspicious thickening about the right sub-maxillary region.

Tracheotomy was performed in four cases, three of which were attended by a successful result.

In one case, the operation was performed for syphilitic laryn-

gitis; in another, for croup; in another, for some injury of the larynx and hyoid bone (?); and the other was an operation which can hardly be called tracheotomy, as it was of a much more formidable character, but it is most conveniently placed under that head in this table. It will be found fully described in a paper in these Reports, written by Mr. Long. In the case of laryngitis, there was nothing worthy of particular note. The case where the operation was performed for croup will be noticed among the deaths after operations. The nature of the injury for which tracheotomy was performed in the other case could not be clearly made out. A lad, fifteen years of age, running along in a foundry, fell, striking his neck against an iron girder. He was brought to the Infirmary livid, insensible, cold, and pulseless, with feeble gasping attempts at respiration, and considerable swelling over the hyoid bone and larynx. His trachea was at once opened, the breathing improved at once, and in a few hours he was quite comfortable. The tube was removed about the sixth day, and the patient went out well on the eighteenth day.

The mortality after operation for *strangulated hernia* has been unusually great, three cases out of five having terminated fatally. The successful cases were both operated on early after strangulation, and in one of them (a femoral hernia, occurring in a middle-aged woman) a large portion of omentum, which was firmly adherent to the sac, had to be cut away. Some mention of the fatal cases is made further on in this paper.

Lithotomy was performed in five cases, four of which recovered. Of the successful cases, three were performed by the lateral method, and one by Allarton's. Three occurred in young children, and one in a young man of nineteen years of age.

Trephining was performed in two instances, both terminating fatally. (*Vide* "Deaths after Operation.")

The following *arteries have been ligatured*, for disease or wound, during the last year:—The Carotid, the Femoral (two cases), the Brachial, the Lingual, the Radial (two cases), the Ulnar, and the Posterior Tibial. The carotid was tied for aneurism, and in this case the patient died. The other cases have terminated successfully. The femoral was tied in one case for popliteal

aneurism. (Flexion of the knee and compression of the femoral had been tried without success.) The other case was one of traumatic aneurism of the femoral artery, caused by a punctured wound by a penknife, received a fortnight before admission. It would be out of place here to go into the history of the case during that period. The symptoms were well marked, but in consequence of the patient's assertion that the swelling had not increased for two or three days, and also of the fact of the pulsation rather diminishing during the first day or two of the man's residence in the Infirmary, it was decided to try the effects of rest for a short time. The patient was kept quiet in bed; the foot, leg, and thigh firmly bandaged, and opium given. Under this treatment the pulsation certainly became less for a time; in fact, after ten or eleven days, it was hardly to be detected. However, about the thirteenth or fourteenth day, the man complained of excessive pain down the ham and back of the leg, and on removing the bandage it was found that pulsation had returned, and that the swelling had increased laterally, and also upwards and downwards, in the course of the artery. Chloroform having been administered, and the femoral compressed, the tumour was slit up, and the clots turned out. The femoral vessels could then be easily compressed by a finger inserted in the wound. A puncture could be seen through which arterial blood flowed, when pressure was relaxed either above or below it, and a ligature was passed, and tied above and below this. In consequence of the disorganized and distorted appearance of the parts, there was considerable difficulty in the passage of the aneurism needle. When the structures between the two ligatures were cut across, it was found that the vein had been included in both. However, the wound was stitched up, and the leg well wrapped up in cotton wool. Not one unfavourable symptom has showed itself since the operation. The sac has suppurated freely, the ligatures came away on the fourteenth day, the wound has almost closed, and at the present time (six weeks after the operation) the man seems perfectly well.

The brachial artery was ligatured for aneurism of the first portion of the radial artery. The patient was a cook on board a steamer, and had aortic valvular disease, but did well.

The lingual was tied for hæmorrhage from the stump of an excised tongue, as has been already mentioned.

The radial was tied a little above the wrist in two cases; in one, for a small punctured wound from a piece of glass; in the other, for a small traumatic aneurism, resulting from a blow received a month before. In this case the tumour gave way, was laid freely open, and the vessel tied above and below.

The ulnar was tied for a punctured wound in the middle part of its course, caused by a knife. The posterior tibial was cut down upon and tied behind the inner malleolus, for hæmorrhage after excision of the ankle-joint, as before related.

There have been two successful cases of *Ovariotomy*. One occurred in a woman, aged 48, who had been tapped five weeks before, and from whom twenty-seven quarts of fluid had been at that time removed. There were no complications in the operation, and the patient went out well twenty-five days after. The other case was that of a woman, aged 30. There were a few adhesions in front. No bad symptoms followed operation. The pedicle was fixed by a clamp, which was removed on the fourth day, and the woman went out well twenty-six days after. There has since then been a case in the Infirmary, in which an operation was attempted, but could not be proceeded with. This was a woman, aged 30, who had been suffering from ovarian disease two years, and had been tapped on two occasions in the Isle of Man. After making the usual incision down through the peritoneum, the adhesions were found to be universal between the anterior part of the tumour and the abdominal walls; the adhesions were very vascular; the tumour was found to be multilocular, and to contain a large quantity of solid material. These circumstances, combined with the fact that the patient took chloroform badly, and seemed to be almost in a state of collapse, caused the operation to be given up. The wound was stitched up. Vomiting came on about forty-eight hours after operation, soon followed by other symptoms of peritonitis, which ended fatally on the fifth day.

Among the cases under the head of "*Removal of Tumours*," there are none requiring special mention. They included examples of various malignant and non-malignant growths, and all did well.

There are two cases of *Vesico-vaginal Fistula* in the list. Of these, one was a large fistula, which was closed after a long and very tedious operation, arising from the size of the aperture and the obesity of the patient. In this case seven silver wire sutures were inserted, of which three were removed on the ninth and the others on the sixteenth day. The patient made a good recovery, without an unfavourable symptom. In the other case, the operation was performed with great ease, and succeeded perfectly, but the patient was seized with symptoms of peritonitis on the fifteenth day, and died. (*Vide* " Deaths after Operation.")

Harelip was operated on successfully in five cases. The ages of the patients were respectively two months, two months, three months, ten months, and ten years. Three were simple cases of single harelip, without other complication; in another there existed a fissure extending from the lip through half the extent of the hard palate; in the other there was a fissure extending through the whole of the hard and soft palates. Any further operation in these last two cases will be left for a future period. In one of the cases harelip pins were not used, the pared edges of lip being brought together by stout wire sutures, which were removed after forty-eight hours. The result was most favourable.

Tenotomy.—In most of the cases for which this operation has been performed, it was for talipes. The tendo Achillis was usually divided in Talipes Varus, also portions of contracted Plantar Fascia. In the after-treatment of these cases the use of elastic cord has been found most successful, exercising a constant and equable force, counteracting the power of the other opposing contracted tendons, and rendering their division unnecessary.

A case of *Ununited Fracture* of the Humerus deserves a few words. It was the case of a healthy farmer, who had sustained a fracture of the humerus, about an inch and a half above the condyles, two years before. There was free movement in every direction when he was admitted. Drilling of the fractured ends was tried on two occasions without success. On the 11th of last December an incision was made on the outer side of the arm, and the ends of the bone turned out and sawn off. The arm was laid on an angular splint, and the man recovered without

an unfavourable symptom. The arm was kept on this splint for about nine or ten weeks, and at the end of that time it was firmly united. About the twelfth week an abscess formed over the site of fracture on the inner side. This was opened, and soon closed up. He left the Infirmary on the 22nd of April, with a good, firm, and useful arm.

Forcible Dilatation of the Urethra for Stricture has been performed in most instances by means of Thompson's dilator. In one or two Barnard Holt's instrument was used. In one of the latter cases death ensued, but this must be attributed to the nature of the case, and not in any way to the instrument used. (The case is referred to further on.) After these dilating and splitting operations, the patients have frequently suffered from severe rigors, and these have, in all instances, been soon relieved by a dose of two or three drops of Fleming's tincture of aconite.

Among the operations under the term ' *Various*,' are included small plastic operations, excision or ligation of hæmorrhoids, &c., and all others not mentioned under the previous headings. None of these require observation except one or two, which will be found among the fatal cases.

The following are the cases where *death* occurred after operation :—

Amputation of both Thighs—Exhaustion.—A railway porter, aged 23, admitted with railway crush of both thighs. Amputation of both at the middle third was performed. Sloughing commenced on the fourth, and death from exhaustion ensued on the tenth day after operation.

Amputation of Thigh — Secondary hæmorrhage. — A man, aged 29, suffering from disease of the knee-joint, with profuse exhausting suppuration. Amputation at the lower third of thigh performed. On the seventh day after operation, hæmorrhage came on suddenly from the femoral artery, and although the vessel was immediately secured, the patient died in about two hours.

At a *post-mortem* examination the original ligature was found still adhering to the end of the artery. Ulceration had taken

place just above the ligature, causing a large opening in the vessel, from which the bleeding had proceeded.

Amputation of Thigh—Exhaustion.—A girl, aged 11, suffering from strumous disease of the knee-joint, with considerable implication of the femur. Amputation was performed at the middle third of the thigh. Vomiting commenced almost immediately after the operation, and continued, in spite of all treatment, until the third day, when death occurred from exhaustion.

Amputation of Leg — Pyæmia. — A woman, aged 64, admitted with severe compound fracture of the leg. Strong carbolic acid was applied to the flaps, the wound was closed by wire sutures, and the edges covered with carbolic acid. Phlebitis showed itself four or five days after the operation, and was followed by pyæmia (abscesses in the neck, &c.), which caused death on the tenth day.

A *post-mortem* examination showed a nutmeg liver, pale flabby kidneys, &c.

Amputation of Leg—Exhaustion.—A cork-cutter, aged 40, was admitted for compound fracture of the internal malleolus, with fracture of the fibula. The case was treated by Lister's carbolic acid method. On the third day spreading traumatic gangrene showed itself. Amputation at the knee-joint was performed. The patient sank two days after.

Amputation at Shoulder-joint—Fractured Spine and Ribs.—A slaughter-man, aged 30, knocked down and run over by a train, was brought to the Infirmary with a crushed arm, fractured ribs, and paralysis of the lower extremities. Amputation at the shoulder-joint was performed forty hours after the accident. (The state of the patient would not permit operation at an earlier period.) The man died about thirty hours after, with symptoms referable to the other injuries, dyspnœa, &c.

A *post-mortem* examination showed that the paralysis was caused by a dislocation between the seventh cervical and first dorsal vertebra, the posterior and lateral ligaments being torn through, allowing free lateral movement and crushing of the cord.

Amputation at Shoulder-joint—Embolism.—A farm labourer, aged 20, came into the Infirmary with encephaloid disease of the

right arm, of nearly two years' standing. Amputation at the shoulder-joint was performed by lateral flaps. Little blood was lost during the operation, but in the evening there was rather free bleeding, necessitating the tying of two or three small vessels. The man did well till about fifty-four hours after the operation, when he became restless and delirious. In a short time symptoms of collapse appeared, and in three hours more he died, apparently of syncope.

Post-mortem examination.—The pulmonary artery, right ventricle, auricle, and innominate vein were found filled with firm white clot, which was adherent to the walls of the right ventricle. In removing the heart, this clot was found to extend into the jugular and subclavian vein of the right side. The clot in the subclavian vein tapered almost to a point, and was not adherent to the vein, nor was there any marked redness of that vessel. The walls of the right ventricle were abnormally thin. No other disease was found.

Amputation of Arm—Pyæmia (?).—A blacksmith, aged 50. Amputation of the arm, just above the elbow, was performed for traumatic gangrene of the arm, arising from the bite of a horse four weeks before admission. A sloughing bed-sore formed soon after the operation, followed on the eleventh day by two or three severe rigors. Death ensued on the fifteenth day.

(Pyæmia ?) No *post-mortem* obtained.

Herniotomy — Internal obstruction — Peritonitis.—A carter, aged 32, admitted with a strangulated inguinal hernia. It had been strangulated on a previous occasion, but had been reduced under chloroform. This time all the usual means of relief were tried without avail. Fourteen hours after strangulation the operation was performed. The stricture was at the external ring. Gut, claret-coloured. The symptoms were relieved, and he passed flatus and a good quantity of healthy fæces per rectum five or six hours after, but the vomiting never ceased. Symptoms of a low form of peritonitis soon began to appear, and the sac suppurated. The man died four days after operation.

Post-mortem.—The gut was fully returned within the abdomen. There was peritonitis of a low form. The portion of intestine

which had been strangulated was of a dark purple colour, and covered with lymph. This discolouration extended along the small intestine for about eighteen or twenty inches, and all the bowel above the lately strangulated part was much distended. It was noticed that, just opposite the internal abdominal ring, the intestine was contracted, and on examination it was found that the gut was fixed, by what appeared to be an old band of adhesion, to a part of the abdominal wall, just external to the internal abdominal ring, in such a manner as to interfere with, but not entirely to obstruct, the passage of fæces. The intestine below this was white, contracted, and free from any appearances of inflammation. On slitting up the gut, the line of demarcation between the distended congested, and the pale contracted, portions was most marked. It appeared probable, therefore, that the patient's death was due to this internal obstruction of the intestine.

Herniotomy — Peritonitis. — A woman, aged 40, admitted suffering from strangulated femoral hernia of five days' duration. Herniotomy was performed within three hours of her coming to the Infirmary, at which time she had already symptoms of acute peritonitis. Vomiting ceased for several hours after the operation, and the bowels were relieved in the course of the next day, but in a short time the peritonitic symptoms became worse, and the patient died on the sixteenth day.

Herniotomy — Gangrenous Intestine — Peritonitis. — A woman, aged 49, admitted with strangulated femoral hernia of two or three days' duration. (The period of strangulation uncertain.) The gut was found gangrenous, laid open, and the edges stitched to the sac. The symptoms were but slightly relieved by the operation, and the patient died of peritonitis on the fifth day.

Lithotomy — Peritonitis. — A man, aged 37, admitted with vesical calculus. (Duration of disease uncertain.) He was very anæmic. He had a very irritable and thickened bladder, and the urine contained pus, consequently it was considered that lithotrity was unadvisable. Lithotomy was, therefore, performed by the lateral method. Considerable difficulty was experienced in finding the stone, and the operation rendered tedious, in con-

sequence of the great depth of the perineum, and also from the prostate gland being disorganized by abscess. A small calculus was removed. Vomiting commenced soon after the operation, and symptoms of peritonitis appeared, and increased rapidly till the third day, when the patient died.

(This case, together with the *post-mortem* appearances, will be noticed by Mr. Bickersteth, in another part of this volume.)

Tracheotomy — Broncho-pneumonia. — A girl, aged 7 months, admitted with urgent symptoms of croup, of two or three days' duration. Was much exhausted by diarrhœa, which had continued for a week or ten days before her admission. Tracheotomy was performed two hours after she was brought to the Infirmary. She was much relieved by it, and improved considerably for about twenty-four hours, when dyspnœa again came on, and in an hour or two she died, with symptoms of asphyxia, probably from broncho-pneumonia. There was no obstruction in the canula, nor in the trachea.

No *post-mortem* examination was allowed.

Trephining — Abscess of Brain. — A woman, aged 23, admitted for scalp wound on the right side of the head, over posterior inferior angle of the parietal bone, with *slight* symptoms of compression. No fracture to be felt. Ten days after admission, she had convulsive movements of the right extremities, and paralysis of the left. Trephining was performed. No depressed bone was found. No injury of the dura mater. The convulsions ceased, and she improved for about thirty-six hours after the operation, when the symptoms returned, and she gradually became worse, until she died, eighteen days after.

At the *post-mortem* examination, there was found a fissure of the parietal bone about five inches long, running along the lower part of the opening made by the trephine to the base of the skull. No depression of bone. There was general meningitis; an abscess in the substance of the right hemisphere; and the right lateral ventricle was full of purulent fluid. Pus was found between the dura mater and cerebellum. Left hemisphere healthy.

Trephining — Erysipelas of Arm — Pneumonia. — A man, aged

24, was knocked down by an engine. On admission, he had a severe compound comminuted fracture of the skull. Trephining was at once performed. A considerable quantity of bone was removed. The man improved considerably for three or four days, and was conscious and sensible. One of his thumbs had been much crushed by the engine. Consequent upon this injury, a low form of erratic erysipelas of the arm set in. After he had been in the Infirmary some five or six days, symptoms of pneumonia appeared, and he died about twelve days after admission.

No *post-mortem* inspection was obtained, but it seemed probable that death was caused by the pulmonary affection, for the only symptom referable to the head was delirium. There were no other symptoms of mischief in or about the brain.

Ligation of Carotid Artery—Suppuration of Sac—Exhaustion (Pyæmia ?).—A woman, aged 42, admitted for aneurism of the upper part of the left common carotid artery. She was suffering from syphilitic cachexia, and the tumour was increasing. There were no complications during the operation, but there was from the first an inactive and unhealthy state of the wound. The ligature came away three weeks after the operation, and about the same time the sac became inflamed, and afterwards discharged pus through the lower part of the wound, where union had not yet taken place. She then began to have frequent attacks of colliquative diarrhœa, accompanied by hectic febrile symptoms, and rapidly became weaker. About sixty hours, and again about forty-eight hours, before death (which occurred on the thirty-eighth day), there was slight arterial hæmorrhage from the wound.

Post-mortem inspection.—The artery had been secured about an inch below the sac. The artery below the point of deligation contained a moderately firm plug of fibrine, but none was observed above this point, nor was there any adhesion of the vessel between the place of deligation and the sac. The sac was almost empty. At the upper part of it there was a small reddish mass of clot. This, which appeared to have shut off the distal end of the artery from the sac, was not all of the same consistency, being much softer in some parts than in others. It was supposed, in consequence, that part of it had been recently dis-

turbed, and a fresh quantity deposited, and that the bleeding had come from this source. (The quantity of blood lost on each occasion did not exceed an ounce and a half.) The brain was softened, more especially about the *right* corpus striatum and thalamus opticus.

No further examination of the body was permitted, but it seems very possible, from the state of the patient during the two or three weeks before her death, that she died of pyæmia.

Excision of the Shaft of the Tibia—Exhaustion.— A girl, aged 8 years, admitted with acute necrosis of the whole shaft of the tibia. She was a very delicate strumous child. The operation was performed with very little difficulty. Within twenty-four hours after, there was free bleeding, which was found to proceed from a vessel in the interosseous membrane. The child never satisfactorily rallied after the operation, and sank from exhaustion on the sixth day.

Vesico-vaginal Fistula—Peritonitis.—A woman, aged 22, admitted for vesico-vaginal fistula of two months' duration. A week after admission, the usual operation was performed. It was completed in twenty-five minutes. Five sutures were introduced. These were removed on the 9th day, when the wound was found to be perfectly united. The patient sat up on the fourteenth day, and could retain her urine perfectly well. On the sixteenth day after operation, she got up early in the morning, and remained out of bed for more than an hour, and soon after returning to bed had a rigor; shortly after this, pain in the abdomen supervened, and in a short time symptoms of peritonitis showed themselves. These increased, peritonitis became general, and ended fatally in five days. Soon after the first onset of this attack, the use of the catheter became necessary, but not a drop of urine was passed per vaginam.

Post-mortem.— On laying open the abdominal cavity, general peritonitis was observed, with purulent effusion. The uterus was large, apparently from imperfect involution, and within its cavity was a small coagulum. On section, its structure seemed healthy, but there was much congestion of its mucous membrane. The fallopian tube of the right side, together with its fimbriæ,

was enlarged and congested, as was also the ovary of the same side. The fistula was perfectly united. The remaining viscera were normal.

Excision of Cancerous Gland—Erysipelas.—A man, aged 70, (who had had several operations performed on him for epithelioma of the cheek, and different secondary deposits in the face and neck,) was admitted for a cancerous gland deeply situated in the upper part of the neck, near the base of the tongue. This gland was removed by an incision below the chin. In a day or two erratic erysipelas showed itself, followed by formation of pus, (which burrowed deeply among the muscles of the neck,) and hæmorrhage. The man died on the eleventh day after operation. (This case is placed among the " *Various* " operations.)

Epithelioma of Vulva—Excision—Pyæmia.—A woman, aged 66, was admitted for a large epithelioma of the vagina and fourchette, This was excised. The wound had almost healed, when, twenty-two days after the operation, swelling and tenderness of the inner and upper part of the left thigh was noticed, accompanied by vomiting and other constitutional symptoms. In a few days more she became jaundiced, and died six weeks after the operation, with all the symptoms of pyæmia. No *post-mortem* inspection was allowed.

Foreign body in Bladder—Acute Cystitis.—A man, aged 30, had broken a piece of gum elastic catheter into his bladder, eleven months before coming to the Infirmary, and for some weeks had been suffering much pain and uneasiness. On admission, he had symptoms of acute cystitis, and also of nephritis, was constantly passing urine mixed with blood, mucus, and pus, and had severe constitutional symptoms. As he was rapidly becoming worse, Allarton's operation was performed. A piece of catheter, four inches in length, twisted up and covered with phosphatic deposits, was removed; but the patient received no relief therefrom. He died on the eighth day. No *post-mortem* examination allowed.

Forcible dilatation of the Urethra— Peritonitis.—A man, aged 29, admitted with stricture of the urethra of four years' standing. He contracted syphilis about four years ago. On admission, he had numerous false passages, and also four or five fistulæ in the

perineum and nates, through which urine and fæces passed. After being in the hospital for a considerable time, forcible dilatation with Holt's instrument was performed. The man became rapidly worse, and died on the third day after operation.

At the *post-mortem* examination, commencing acute peritonitis was found. There were fistulæ running from the urethra to the rectum, and to the perineum, and from the rectum into the pelvic cellular tissue. The whole of the cellular structure between the bladder and the rectum was disorganised from old inflammation, and riddled with sinuses or cavities containing purulent fluid; and this state of affairs existed in front of and round the rectum, even above the brim of the pelvis. Some of these sinuses were only separated from the peritoneal cavity by that membrane itself. It seemed probable that the dilator had passed into one of the fistulous tracts, and had thus set up acute inflammation in parts previously disorganized.

Division of Cervix Uteri—Peritonitis.—A woman, aged 37, admitted for fibrous tumour of the uterus, and severe dysmenorrhœa. Division of the cervix was performed by Simpson's Hysterotome. She began to complain of pain in the region of the uterus, soon after the operation; pain and tenderness soon extended over the abdomen, and death from peritonitis ensued four days after.

At the *post-mortem* examination, the cervix was found fairly divided, but the incision did not extend more deeply than usual into its substance. There was inflammatory redness of this part, extending to the adjacent peritoneum. There were all the usual appearances of general acute peritonitis. The uterus contained a fibrous tumour, about the size of a hen's egg. (This case is placed among the "*Various*" operations.)

CLINICAL ENQUIRY INTO THE RESULTS OF HAN-COCK'S OPERATION, OR THE DIVISION OF THE CILIARY MUSCLE, IN CERTAIN SERIOUS DEEP-SEATED AFFECTIONS OF THE EYE.

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Two operations have lately been brought before the profession for the relief of certain deep-seated affections of the eye, attended with serious injury to the sight, if not even total loss of vision. These are iridectomy, and the division of the ciliary muscle; which last is often called Hancock's operation.

The diseases for which these operations have been proposed are various, but all agree in being attended with pain, and fullness or tension of the eye-ball; and with more or less deep-seated inflammatory action which rapidly affects the sight, so as to produce partial or total loss of vision. The most formidable of these diseases is glaucoma, acute or chronic; and the most common of them is rheumatic inflammation, affecting first the sclerotic, and then the iris and deeper tissues, until at length vision is almost entirely gone.

The first of these operations results in a permanent loss of a portion of the iris, and cannot be regarded otherwise than as grave and important in its nature. The second generally leaves no visible traces beyond a cicatrix at the margin of the cornea, which is so slight as to require careful examination for its discovery; though it sometimes results in an oval instead of a

circular pupil, and in some rare instances in a slight prolapsus of the margin of the iris, which produces a small dark spot at the junction of the sclerotic with the cornea. The first operation (iridectomy) necessitates confinement to bed for a time, and other accompaniments of an important operation, whilst the second (Hancock's) is so slight, in comparison, that the patient may generally be allowed to return home at once from the Hospital or the consulting-room.

The object of both operations is the same, viz., to remove the intra-ocular pressure supposed to exist between the lens and the retina, by which the nervous system of the eye is paralysed, if not ultimately disorganised, and atrophied.

The praises of iridectomy, and the necessity for its performance, have been prominently brought before the profession ; and nothing need be added on that score ; but although Hancock's operation has not been without its advocates, it has not become so generally and favourably known ; and for one who has heard of division of the ciliary muscle twenty have heard of iridectomy. If, however, the simpler operation is capable of giving efficient relief in these cases, it is manifestly a gain to possess a simple operation un-attended by permanent injury to any portion of the eye, as a substitute for a formidable, however successful one, which is essentially dependent upon the removal of a considerable portion of so important an organ as the iris ; and the object of the follow-ing paper is to relate a series of cases in which the minor operation was tried, in order to test its value. It may be right to add that the enquiry was undertaken with the hope that the simpler opera-tion might prove successful, though without any prejudice against the more serious one of iridectomy, if experience should prove that it must be our first operative treatment, instead of being a measure that may safely be postponed, until the other has had a fair trial in any particular case.

As the tests frequently referred to are the types now universally adopted by ophthalmic surgeons, but not generally known to the general practitioner, they are here printed for convenience of reference.

No. 2.   at the foot of a sloping hill.

No. 4.   the dishes, plates, and coppers.

No. 6.   fit to keep up.

No. 8.   my son and me.

No. 10.   which we had lost.

No. 12.   to read the.

No. 14.   how well so-ever.

No. 16.   provisions

No. 18.   general

No. 19.   team

No. 20.   Sun

CASE 1.—*Complete loss of vision in right eye—rapidly failing sight in left, constant pain, with no visible external indications of blindness.*

Miss P., aged 48. History.—Thought her sight was failing from advancing age, and began to use spectacles; but found that first one type and then another became invisible, until at length she could not read the largest print she could procure, in a bible or prayer-book. Had constant pain in the eyes, which kept her

awake at night from its severity. Duration of case, a few months. Had been treated for neuralgia and hysteria, as there was no visible sign of local mischief, no inflammatory redness, dulness of cornea, or irregularity of pupil.

Condition when first seen. — Both eyes to all appearance healthy, on a mere external examination; globes tender on pressure, and tense; pupils yielded to atropia, and dilated regularly.

Right eye. — Optic disk almost invisible; vitreous turbid, and filled by numerous striæ, resembling a cobweb. *Left eye*, similar condition, but to a slighter extent.

Right eye. — Quite useless, had no distinct vision of large objects in the streets, could not distinguish the letters of No. 20. Divided the ciliary muscle, and ordered small doses of turpentine, with poppy fomentations. She returned the same day to her residence at a distance, but in a week visited me again; the pain was less, and she was able to sleep, and could now read No. 20, but not No. 19. Three weeks after this, the same operation was performed on the left eye, and as her health was feeble she was ordered a tonic. In another month she again visited me, and the following is the memorandum in my Case-book: " Since the division of the ciliary ligaments, she has been entirely free from pain in her eyes, which formerly kept her awake at night from its severity, and she can now read small print for three hours without glasses, while she could not read the largest print with glasses before the operation. Very slight appearance of spots or cobwebs. Four months after this she visited me again, the left eye continued healthy, and the right eye free from pain, and she could read No. 19 with it; and when dilated by atropia, she could read No. 18. But the lens was becoming slightly cataractic." Since that time (four years since), I have not seen her.

CASE 2. — *General Inflammation of all the Tissues.*

Joseph C., aged 49. About twelve months since he received a blow on one eye, which caused partial loss of vision, without much pain. In a few weeks the sight was perfectly restored, after the application of three or four blisters.

Three weeks since had a bad cold, and whenever he coughed,

flashes of fire went through that eye. He had no pain in the eye itself, but a little in the forehead, and there was no visible inflammation of the eye. In two or three days the sight began to fail, and six days since the eyes began to inflame and became rather painful. From this time the case became worse, but there was not severe pain.

Condition when seen.—Cannot read No. 20, anterior chamber distended, and iris pressed back by semi-opaque aqueous humour. Iris hazy; vitreous turbid; conjunctival inflammation so considerable as to hide the sclerotic entirely. The ciliary muscle was divided, and poppy fomentations and a purgative were ordered. The operation was attended by great pain. Next day he was free from pain, and could read No. 18. The iris was less hazy, and the anterior chamber was natural in appearance and extent; conjunctival inflammation still very great; poppy fomentations and belladonna dilated the pupil, and the case progressed favourably under simple treatment from that time. In a short time he was able to resume his occupation as an engineer in a steamer.

CASE 3.—*Inflammation advanced to the formation of pus in the anterior chamber.*

The notes in this case are very brief.

G. H., aged 30. Could barely see his hand. Sleepless from pain for three weeks. Hypopion barely commencing. Divided the ciliary muscle.

On the second day, "not like the same man. Can sleep easily."

On the fourth day, "can see objects easily across the room."

I have no further notes of the case. If the progress had been unfavourable, they would have been continued. The constitutional treatment consisted of the application of belladonna to the eye, and minute doses of bichloride with 15-grain doses of cinchona bark three times a day.

CASE 4.—*Rheumatic Inflammation of Right Eye.*—*Almost total loss of vision.*

Mrs. H., aged 30. Had suffered from rheumatic inflammation

for above a fortnight when she consulted me. Had received ordinary appropriate treatment from a skilful surgeon during this time.

Condition when seen. — Could not distinguish a man from a woman. Incessant pain, which had kept her awake day and night for several days. Globe tense, and acutely tender on pressure. Cornea hazy. Sclerotic inflammation. Pupil irregular, and had resisted all attempts to dilate it by belladonna. Disk perfectly invisible, from the turbid, opaque condition of the vitreous. Health broken. *Divided the ciliary muscle*, and applied poppy fomentations, with belladonna, and other treatment similar to what she had previously used.

She slept comfortably that night, and the next morning was almost free from pain, and the pupil was beginning to dilate. It was still very irregular. The following day she could distinguish my features, and she gradually improved from this time. She can now see to read No. 6.

CASE 5. — *Rheumatic Inflammation, with almost total Loss of Vision, in a previously diseased eye.*

Mr. C., aged 47. Has been the subject of several attacks of rheumatic inflammation in both eyes, which had produced adhesions of the iris, and a permanently irregular pupil in the right eye, with imperfect vision, though he could still read with difficulty. An attack this spring was more than usually severe, and the pain deprived him of rest, and seriously affected his health. He had obtained so much relief last year from the pain and other serious symptoms, by the division of the ciliary muscle in the left eye, that the operation was strongly urged upon him for the right eye, but he shrank from the thought of an " operation," " cutting, &c.," and would not consent to it until his strength had failed considerably, and his sight was so much affected, that when looking at my face he could merely see that there was something in front of him. After the operation he never had a return of the previous severe pain, and was able to sleep at night. His pupil yielded considerably to the action of atropia, and his general symptoms improved. The restora-

tion of sight was very gradual, and he took iodine, quinine, &c., for some weeks. At the end of about two months he could tell the time by the seconds hand of his watch, and his condition was similar to what it had been previous to his attack.

CASE 6.—*Sclero-iritis, with great injury to vision.*—*Chronic case.*

Eliza L., aged 24. Had been suffering for a month before admission to the Eye Infirmary, but had had no treatment whatever, from carelessness on her own part alone.

Condition on admission.—Cannot distinguish one person from another. Pain in eye severe, somewhat intermitting. Subject to exacerbations. Zonular ring of inflammation surrounding the cornea. Iris hazy. Pupil fixed. Anterior chamber distended. Divided ciliary muscle, and, for the sake of observing its effects, no other treatment of any kind was ordered.

Next day much less pain. Can see my face better, but not well. Less zonular inflammation. Pupil dilating; irregular.

Being satisfied with the result of the operation, I now ordered belladonna and iodide of potassium.

In three days the pupil was dilated, and nearly regular, and she could see the hour by a clock, and read No. 14 with difficulty.

The treatment was continued, and the case terminated favourably.

CASE 7.—*Rheumatic Iritis.*

Bridget M'C., aged 35. Had been for three weeks under ordinary treatment, with no beneficial result.

Condition when seen.—Ordinary appearances of rheumatic iritis. Cannot see whether a piece of paper is plain or printed. Divided the ciliary muscle, and continued treatment similar to that previously used. She attended at the Eye Infirmary again in three days, and was free from pain, and could see which was the printed side of the paper easily. The following week she could see whether the print was right side up or not. In eleven days she could see No. 12 distinctly, but not read it; but in three days more she could read No. 10, and was still free from pain; and the case gradually continued to improve.

CASE 8.— *Disease of all the deeper tissues, and extreme loss of sight, with little or no pain.— Improvement less marked than in the former cases.*

M. E. H., aged 16.   Delicate strumous-looking girl.   Had been troubled with inflammation of a slow languid character for about three weeks, and in spite of treatment had been getting worse.

Condition. — Cannot tell a man from a woman.   Zonular inflammation.   Cornea and iris hazy, and pupil irregular. Vitreous turbid and lost its transparency.   *Little or no pain,* and little tension of globe.   Divided ciliary muscle, and continued the same treatment as before.

In three days she could see the patients in the visiting-room, and could tell whether the hand was open or shut, but could not even see that No. 20 was separate letters.   Still no pain.   In a week she "sees a little clearer," but still very imperfectly.   Optic disk totally invisible, through the opaque and brown-coloured vitreous.

GENERAL CONCLUSIONS.—The foregoing are not picked cases, but they have been taken as they presented themselves in practice. Cases of minor severity, in which the operation has been performed as a precautionary measure, have not been introduced. And those cases have not been mentioned in which it has been performed in the hope that it might possibly supersede the necessity for iridectomy, but in which the hope has not been fulfilled, but this operation has still been necessary.   Such cases have been but few, and the patients have not been worse off in consequence of the proceeding, and they have had the chance given of being saved the more formidable operation.

The cases reported above have been generally of a very grave character.   The loss of vision has been extreme in some instances, and considerable in all, and the pain has generally been to an urgent degree.   They have not been styled "glaucoma" in their titles, as this name has been the subject of so much controversy, that I have preferred describing the parts of the eye affected, and the symptoms, to using a term of disputed meaning.   Some

of the cases might, however, have been properly termed glaucoma and others have been aggravated cases of rheumatic affection. It may be noted that the case in which the smallest amount of benefit was derived was the last of the series, and it was distinguished from all the others by the marked absence of pain. Sluggish strumous degeneration of the eye was its chief characteristic; and whilst those cases in which pain and rapid loss of vision were prominent features, were benefited to a degree beyond our earlier expectations, this, in which pain was absent, and there was no appreciable tension of the globe, was improved in a very minor degree.

The operation itself is often, perhaps we may say generally, accompanied by an amount of pain, for which it is difficult to account; and it is sometimes three or four hours before this pain subsides; but when it does cease, the sleep succeeding the operation the first night, and the freedom from return of pain, are well-marked results of the operation.

The operation generally leaves little or no mark of its having been performed, but if there is much straining on the part of the patient, by holding the breath or otherwise, a minute portion of iris sometimes protrudes in the wound, and a slightly oval pupil is the result. I have seen the accident occur sufficiently often to show that care must be taken to guard against it; but no permanent disadvantage arises from it, beyond the slightly altered figure of the pupil.

On the whole, the result of the operations has been so decidedly favourable as to raise this mode of treatment to a high position in the estimation of my colleagues in the Eye Infirmary, as well as in my own; and these Cases are published in the hope that they may promote our knowledge of a valuable and simple operation, which may be substituted, in a large proportion of cases, for the more serious one of iridectomy.

CONTRIBUTIONS TO PRACTICAL MIDWIFERY,

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CASES ILLUSTRATIVE OF THE USE OF THE FORCEPS.

In a short treatise, published in the early part of the present year, I ventured to bring before the notice of the profession the principal arguments in favour of an earlier and more frequent recourse to the forceps, than is recommended or sanctioned by the greater portion of the standard authorities on Midwifery, in those cases in which labour is either inordinately prolonged, or in which there is reason to believe that it will prove tedious, although none of the symptoms may have yet appeared which have been held to be essential indications for instrumental interference. I also expressed my decided preference for the long over the short forceps in all cases, and in every position of the child's head, and especially insisted upon the importance of adopting the form of instrument constructed on the principles of those known as Ramsbotham's, Roberton's, or Simpson's long forceps, having the pelvic as well as the cranial curve, and, what is equally essential to their complete efficiency, parallel shanks in front of the lock, affording the two-fold advantage of bringing the lock entirely clear of the vulva, and thus avoiding all risk of including the hair of the pubis or the soft parts of the mother in its grip, and at the same time preventing that forcible distention and stretching of the passages, which must always be caused, to a greater or less extent, by forceps in which the blades spring directly from the lock. I have observed with much

satisfaction that these points, regarded by me as indispensable in the proper construction of the midwifery forceps, have received the sanction of so high an authority as Dr .Barnes, in his Lectures on Obstetric Operations now in course of publication in the *Medical Times and Gazette*, and in which he indicates his high appreciation of the forceps, by speaking of it as the "noblest of all obstetric instruments."

The following Cases, selected from the records of my private and consultation practice, and from those occurring in the Ladies' Charity, all within the last twelve months, will serve to illustrate practically some of the points which I have already advocated theoretically in my former paper. It will avoid repetition to state here, that in all the cases the forceps used was that recommended by Dr. Roberton, and that the patients were all kept under the full influence of chloroform during the operation.

CASE 1. — *Lingering Primiparous Labour — Forceps delivery before full dilatation of os uteri — Result favourable to mother and child.*

Mrs. R., aged 25. Labour commenced on the 25th of August, 1866, about six p.m., and slowly progressed until the evening of the following day, when I found that the membranes had ruptured some hours previously, the os uteri was about one-half dilated, the anterior lip having descended in front of the head, which was presenting in the first position, and engaged in the brim. During the next three hours the pains, although regular, were deficient in propulsive action, and no perceptible progress was made. I cautiously introduced the forceps, guiding the blades carefully within the os uteri, and proceeded to deliver, slowly and gradually, using traction at intervals corresponding with uterine action. At 11.30 p.m., about thirty-one hours from the commencement of labour, a living female child was extracted. The patient made a good recovery.

Remarks. — This case affords an illustration of the fallacy in the teaching of those who insist upon full dilatation of the os uteri as an essential condition in the application of the forceps, on the ground that it is hazardous to pass the blades within

the uterus. If such a rule were followed, the use of the instrument would be necessarily forbidden in a wide range of cases, especially in primiparæ, until, by delay, the patient must have passed the confines of safe labour.

CASE 2.— *Multiparous Labour slightly obstructed by a minor degree of disproportion—Forceps delivery, with favourable results to mother and child, especially as contrasted with unaided labour in the same patient.*

Mrs. R., in labour with her fifth child, on 14th October, 1866. I delivered this patient of her first child with the forceps, having waited much longer before interfering than I have since been accustomed to do ; the difficulty then, as on the present occasion, depended upon slight disproportion, the child, a male, being large, and the pelvis, though well formed, was somewhat below the standard capacity. The father was a very tall bulky man, the mother small, and of low stature. Her convalescence was prolonged and unsatisfactory ; she had paralysis of the sphincter of the bladder for several days after delivery, and did not fully regain her strength for several months. Her three subsequent labours were tedious and prolonged, her sufferings considerable, and her recoveries, though finally complete, were protracted beyond the usual period. Bearing in mind these points in her history, I resolved on the present occasion not to allow her to remain undelivered longer than could be avoided ; accordingly, as soon as the second stage of labour had fairly set in, and before the head had fully entered the cavity of the pelvis, I watched the effects of the pains closely, and finding that, notwithstanding the vigorous action of the uterus, little or no progress was made, and as the patient already expressed much anxiety to be relieved, I applied the forceps, the head still being high up in the pelvis, and delivered her of a living male child in less than an hour. Her recovery was perfectly satisfactory, affording a striking contrast to the result of her three preceding labours, which were conducted on the now nearly obsolete principle of non-interference except in extreme cases, and of her first

delivery, in which assistance was unnecessarily, and I believe injuriously, delayed.

Remarks.—This case affords a comparison of the results of two opposite methods of managing labour in the same patient; it is also an example of the superiority of the long over the short forceps. Delivery with the latter at the stage described, would have been extremely difficult, if not impossible, and consequently, if used at all, their application would have involved considerable delay, with the inevitable risk of giving rise to those unfavourable conditions which it is the express object of instrumental aid to avoid.

CASE 3.—*Primiparous labour, simply tedious—Forceps delivery —Result favourable to mother and child.*

Mrs. W., aged 25. Rather a delicate woman, taken in labour on the 1st December, at six p.m., progressed regularly and favourably for about eleven hours, when, the head having become fully engaged in the cavity of the pelvis, further progress was almost completely arrested. I then applied the forceps, extracted a full grown living female child, delivery being completed at 7.30 a.m. on the 2nd, namely within fourteen hours from the commencement of labour. Convalescence was slightly interfered with by ephemeral fever, but was otherwise satisfactory.

CASE 4.—*Second labour—arrest from slight disproportion— Forceps delivery—Result favourable to mother and child.*

MRS. W., aged 22, an undersized but well-made woman. Her first labour, although tedious, was completed without instruments. She was taken in labour, for the second time, on 17th of April, at two a.m. I visited her shortly after, and found the head presenting in the first position, engaged in the cavity of the pelvis; uterine action was strong, yet insufficient to overcome the obstacle. I applied the forceps, and found that strong extractive efforts, and considerable time, were required to effect delivery. The child, a large living boy, was born at 10.30 a.m., within nine hours from the commencement of labour. The patient made a good recovery.

Remarks.—The two foregoing cases illustrate a principle in practice which I am anxious to enforce, and which may be said to constitute one of the essential differences between the rules of practice inculcated by Denman and his followers, and those later views, as to the use of instruments, which are daily becoming more and more generally recognised by accoucheurs of the present day. The forceps was applied in the absence of any decided symptoms indicating the necessity for immediate delivery, and where, very possibly, the delivery might have been effected without its aid. The grounds upon which the propriety of artificial delivery in such circumstances founded, are—

1st. The axiom in midwifery, that the duration of labour, beyond a moderate period, is, *per se*, an element of danger, and one which produces a more or less unfavourable effect upon the subsequent recovery of the patient.

2nd. That experience and observation, in many cases, enable the accoucheur to predict with tolerable certainty that the labour will prove unusually protracted, and thus to anticipate the unfavourable complications which so frequently result from delay, and by waiting for the actual appearance of which, the chances of a favourable result are greatly diminished.

3rd. That when it appears probable that the forceps will be required to complete labour, the facility with which they can be applied, and the safety of delivery, as regards both mother and child, materially depends upon its employment at the earliest period of the labour, at which its use is admissible.

CASE 5.—*Multiparous labour—attended by a Midwife—face presentation—Forceps delivery—Favourable result to mother and child.*

A widow, aged 35, commenced in labour at five a.m. I saw her at ten a.m., found the face presenting, pains had been very violent for some time without causing any advance, and leading the midwife (an experienced woman) to fear rupture of the uterus might occur. I applied the forceps over the sides of the posterior portion of the head, which was just beginning to engage the

hollow of the sacrum, and by a lever action with scarcely any downward traction I caused the occiput to sweep the curve of the sacrum and distended perineum; the chin at the same time ascended over the posterior surface of the pubis, and delivery was completed with ease in a few minutes. The child, a male, was alive, but presenting a hideous appearance, from swelling and discolouration of the forehead and side of the face, all of which however rapidly disappeared. The mother did well.

Remarks. — This mode of delivery differs from that usually recommended in face presentations. Some accoucheurs prefer the vectis, an instrument I have entirely discarded from my own practice, as in my opinion less dependable, and not so safe as the forceps. We are advised by others to content ourselves with assisting the rotation of the face forwards by making traction, with the fingers placed in the child's mouth; a manœuvre which will doubtless succeed in many cases, and is founded on correct views of the mechanism of this form of malposition; but in the present case immediate delivery was called for, by the powerful action of the uterus threatening rupture, and increasing every moment the risk to the child; and the plan adopted effected this object with ease, promptitude, and safety, to both mother and child.

In each of the seven cases which follow, the child was still-born, being I believe in most, if not in all of them, sacrificed to delay, the forceps not having been used in a sufficiently early stage of labour. They illustrate a point in practice which has scarcely received the attention which it deserves, — namely, the safety of the child as an element of consideration in deciding upon the propriety of artificial delivery.

Case 6. — *Primiparous labour — Tedious throughout from deficient action — Forceps delivery — Result favourable to mother — Child born asphyxiated, from long continued pressure — Recovery rendered hopeless by immediate separation of placenta.*
This patient was 30 years of age, of a delicate constitution, with

phthisical tendency. Labour commenced on Saturday, at four p.m., membranes ruptured at eight the same evening, from this time uterine action gradually decreased, and after some hours almost entirely ceased. Her medical attendant suggested the propriety of affording artificial aid, but the patient for some time obstinately refused her consent, at six o'clock on Sunday morning, labour having lasted for about twelve hours, my assistance in consultation was requested. With some trouble we prevailed on the patient to submit to the use of instruments. She was put under chloroform, and I applied the forceps to the head, which was firmly wedged low down in the pelvis. Extraction occupied nearly an hour, and required strong traction. The child, a full grown male, was asphyxiated, and although the heart's action was distinctly felt, all the usual means, including galvanism, persevered in for a considerable time, failed to excite respiratory action. The placenta was thrown off immediately, and had probably become detached before the birth of the child was completed.

Remarks.—In this case, the child's life was probably sacrificed to delay, for which, however, the patient herself was mainly responsible. The premature separation of the placenta no doubt greatly diminished the chances of resuscitation.

CASE 9.—*Primiparous labour, attended by a Midwife, protracted from undue rigidity of maternal passages — Child still-born — Laceration of perineum — Mother recovered.*

This woman was 30 years of age, stout, large limbed, and rather corpulent; she had been in labour for twenty-four hours; the head was still impacted high up in the pelvis, where it had remained stationary for several hours. The passages were so rigid and undilatable, that the hand could not be passed into the vagina without considerable difficulty. The sounds of the fœtal heart were feeble and indistinct. Chloroform having been administered by an assistant, I applied the forceps, and with considerable exertion extracted a full grown female child, quite dead. The soft parts were so rigid and indistensible, that, in spite of every precaution, a slight laceration occurred at the anterior border of the perinæum, during the passage of the head, which was still further extended

by the expulsion of the shoulders. The sphincter ani, however, escaped. Immediately after delivery, I brought the edges of the wound together with silver wire sutures, it healed satisfactorily, and the woman made a good recovery.

CASE 8.—*Multiparous labour, protracted from slight dispro-portion—Attended by a Midwife—Forceps delivery — Child still-born—Mother's recovery favourable.*

This was a third labour, the two previous ones having been diffi-cult. The child, a full grown male, was quite dead, having doubt-less perished from continued compression, which the moulding of the head showed to have been considerable. Labour had been going on for many hours before I saw her.

CASE 9.—*Primiparous labour, attended by a Midwife — Forceps delivery—Child still-born—Mother recovered.*

When I saw this woman, she had been in labour many hours, the head having rested low in the vagina for some time; there was an olive coloured discharge from the passages, but the patient, although worn out and anxious, had no alarming symptoms; the midwife had given ergot. Delivery was accomplished quickly, and without difficulty, but the child was quite dead.

CASE 10.—*Primiparous labour, attended by a Midwife·—Pro-traction from uterine inertia·—Forceps delivery —Mother saved—Child still-born.*

The woman was 19 years of age, and had been in labour eighteen hours. Head presented in the first position. I applied the forceps, and, after much time and difficulty, extracted a female child, quite dead. Mother recovered favourably.

CASE 11.—*Multiparous Labour, attended· by a Midwife — Protraction from uterine inertia — Occipito-posterior posi-tion, the 4th of Naegelè — Forceps delivery — Mother saved, child still-born.*

The patient was a poor Irish woman, living in one of the worst parts of the town; the mother of nine children; she had been in

labour nine hours; the head was lying low in the pelvis in the fourth position; labour had been tedious throughout, the pains having latterly almost disappeared. I delivered her with the forceps easily in a few minutes. The child, a full-grown male, was quite dead. The uterus was large and doughy for some time after delivery, but no hæmorrhage occurred. Recovery favorable.

CASE 12.—*Second Labour, attended by a midwife*—*Arrest of head from narrow outlet*—*Forceps delivery*—*Mother saved, child still-born.*

The woman, aged 23, was short and square built, with broad hands and large joints. Her first labour was said to have been good; the child, a female, born alive.

The membranes ruptured ten hours before my arrival; pains continuing strong, but for the last three hours no progress had been made. I found the head lying in the transverse diameter of the pelvis, rotation not having been effected, and further descent impeded by the projection inwards and undue thickness of the ischial spines. The soft parts below were much tumefied, several small thrombi had formed on the nymphæ, and one on the posterior wall of the vagina, indicating the existence of great and continued pressure of the parts above. I found more than usual difficulty in adjusting the forceps, but after persevering cautiously I succeeded in obtaining firm hold. Extraction occupied about an hour and a half, and required the application of considerable force. The child, a male, was quite dead. The moulding of the head indicated a high degree of compression. The mother recovered without a bad symptom.

The five following and concluding cases of the series might seem, at first sight, to prove the safety of delay. In all of them labour had been considerably prolonged before the forceps were used, and in all the result was favourable both to mother and child. But it must be borne in mind that in four out of the five there was no disproportion, and, therefore, the compression of the head in its passage through the bony ring of the pelvis was at no

period excessive. These and other favourable conditions cannot always be known beforehand, or calculated upon in a given case of protracted labour, and therefore an occasional favourable issue, where interference has been unduly postponed, should be regarded as a fortunate escape, rather than as a result to be confidently expected. In the one case, in which slight disproportion existed, the forceps were applied before the head had fully engaged in the brim, and the danger of prolonged and extreme compression was thus avoided.

CASE 13.—*Multiparous Labour, attended by a midwife.—Head arrested by rigidity of os coccygis—Result favourable to mother and child.*

This patient had been delivered two years previously with the forceps by another practitioner. On this occasion, she had been in labour about ten hours, all having gone on satisfactorily until the head reached the outlet, where it was detained by rigidity of the os coccygis. I applied the forceps, and cautiously extracted a living male child. The mother did well.

CASE 14.—*Multiparous Labour, attended by a midwife—Delay from malposition, face to pubis—Forceps unsuccessful—Cephalic version—Mother and child saved.*

This woman was 39 years of age, and the mother of eleven children. Previous labours good. She had been in labour nine hours; the pains were vigorous, but the head did not advance. The pelvis was roomy, and the sole cause of delay was the occipito-posterior presentation. I applied the forceps laterally, and succeeded in extricating the head from its fixed position, but the forceps showing a tendency to slip, I removed the blades, introduced my hand, and with the greatest ease changed the position of the head into the occipito-anterior position. Nature completed the process, and a living male child was born in a few minutes. The forehead was contused and swollen from long-continued pressure against the pubis. The woman ultimately recovered, but her convalescence was retarded by neuralgic pains

in one hip and thigh. I attribute this complication to the needless prolongation of labour, which might have been safely terminated some hours earlier by the means adopted at the last.

CASE 15.—*Primiparous Labour at Thirty-eight years of age—Arrest in the latter part of second stage from rigidity—Result favourable to mother and child.*

This patient had been in labour for about thirty hours, when my assistance was requested by the gentleman in attendance. I found the head presenting in the first position, resting on the floor of the pelvis, where it had remained stationary for about four hours. The pains had been active until within the last hour or two, when they gradually declined in force and frequency. I applied the forceps, and by lever action, with little or no downward traction, extracted a fine living male child in a few minutes. The patient did well.

CASE 16.—*Multiparous Labour, attended by a midwife—Delay from slight disproportion—Forceps delivery, with safety to both mother and child.*

The patient, aged 30, the mother of six children, had been many hours in labour. The membranes had ruptured twelve hours before I saw her. I found the head presenting in the third position, and *just beginning to engage in the brim.* The os uteri was not yet fully dilated, the pains were vigorous, but caused no perceptible advance of the head. I applied the forceps at once, and delivered slowly, using tolerably strong traction at intervals. The head in its passage through the pelvis rotated into the occipito-anterior position by the natural mechanism, without any twisting or lateral direction being given to it by the forceps. The child was born alive, owing, I believe, to the head not having fully engaged in the brim, and, therefore, not being subjected to compression during the long interval of delay previous to the use of the forceps.

CASE 17. — *Multiparous Labour, attended by a midwife —Delay from slight disproportion—Forceps delivery, with safety to mother and child.*

This patient was 40 years of age, the mother of seven children, and had been seven hours in labour when I saw her. The pains had been vigorous for some hours, but latterly decreased in frequency and force. I found the head in the first position, arrested in the cavity of the pelvis. I delivered with the forceps with moderate exertion. The child, a male, was living. The moulding of the head indicated slight disproportion. Recovery favourable.

OBSERVATIONS ON FEVER IN LIVERPOOL.

By ROBERT GEE, M.D., M.R.C.P.,

PHYSICIAN TO THE LIVERPOOL WORKHOUSE AND FEVER HOSPITALS, AND LECTURER ON
DISEASES OF CHILDREN AT THE ROYAL INFIRMARY SCHOOL OF MEDICINE.

LIVERPOOL has acquired an unenviable reputation as a home for fever. We are now witnessing the decline of an epidemic which for severity has been unexampled since the "Irish fever" of 1847, and which for duration has greatly exceeded that memorable visitation. The foe takes its departure but slowly, as though unwilling to quit a spot where it has severed so many ties, and found scope for its pestilential and deadly action.

The town is never exempt from cases of typhus, so that it may be said to be endemic. In 1860, when the mortality from fever was unusually low, there must have occurred at least four thousand cases to account for that comparatively low death rate. From that period, fever, at first gradually, and then rapidly increased, until it reached its culminating point in 1865, when the deaths in the borough numbered 2,338, representing at the least 30,000 persons stricken with the disease.

The guardians of the public health were naturally alarmed, and perplexed to find that, notwithstanding all their efforts, a disease, generally acknowledged to be a preventable one, was numbering its victims in the proportion of 5 per 1,000 per annum of the whole population, and 13·9 per cent., or more than one-eighth part, of the whole number of deaths recorded within their jurisdiction.

How is this condition of things to be explained? To what must it be attributed? These questions have often been asked, but it is not easy to give a categorical, determinate answer. In order to arrive at an approximate explanation, it will be necessary to review briefly the conditions favourable to the dissemination

of fever, and to inquire whether they exist in such measure in Liverpool as to account for its unsatisfactory sanitary state. But, in the first place, it would be well to consider whether there is any defect as regards the situation of the town, or faulty management on the part of the municipal authorities, to account for it.

1. *Situation of the town.*—This, taken as a whole, may be said to be unexceptionable. It has for its substratum the red sandstone, has a westerly aspect, is built on the side of a hill, is open to the north, west, and south, and has a large tidal river at its base. It has thus secured to it the full benefit of the sun, with free scope for ventilation; it is in great part sheltered from the east; its site affords convenient falls for the removal of drainage, with the sea for its depository; a combination of elements of salubrity rarely equalled in any large town. There are districts known as the "low" parts of the town, but they are sufficiently elevated to admit of good drainage.

2. *Action of the Municipal authorities.*—It must be candidly admitted that the Town Council have not been neglectful of the public health. They have, on the contrary, been unwearied in their efforts to raise its standard. This will be obvious from the following summary of the works which have been carried into execution, or are in process of accomplishment, under their auspices, viz., the completion of a comprehensive scheme of sewerage, the introduction of a constant and plentiful supply of water, the erection of baths and washhouses, the formation of public parks and grounds for recreation, the opening up of ill-ventilated courts and the demolition of houses unfit for residence, the widening, repaving, and scavenging of streets, and the partial substitution of water closets for noisome, mephitic open middens. When it is stated, in addition, that these improvements have been, and are being, carried out under the advice and superintendence of medical officers and engineers of acknowledged repute, it will be at once seen that our municipal authorities have not been indifferent to the health of the town, but have availed themselves of the advantages presented by its situation, and introduced all recognised sanitary improvements. It is clear, therefore, that the fact of typhus being endemic here, is not owing to insalubrity

of situation, nor is it the result of defective sanitary arrangements. Individual nuisances crop up from time to time, it is true, but they are exceptions, and do not affect the broad features of the work which is being carried on with a view to the general improvement of the town.

I now pass on to the consideration of the *predisposing* causes of fever, and propose to inquire how far they exist, and what influence they exercise on the spread of fever in Liverpool. They may be classified under the heads of destitution, intemperance, over-crowding, bad drainage, and the foul, uncleanly habits of the lower orders. Unfortunately, the public have entertained the idea that these are the efficient causes of typhus; and as the profession have not pointed out the error, and explained that in which they differ, they are commonly supposed to be identical in action. It is very desirable that sounder views on this subject should be promulgated, for the attention of the authorities and the community is withdrawn, in a great measure, from what really propagates the disease, *i. e.*, a morbid poison disseminated by contagion, and concentrated upon those causes which are only predisposing. The sanitary measures, accordingly, bear reference chiefly to these, while subordinate importance is attached to the former, the principal factor of the fever-producing agencies.

1. *Destitution.*—There must necessarily be a large amount of poverty in this town, where so much unskilled labour is required, where there are so many immigrants in search of employment, where the cost of living is comparatively high, and where, owing to various circumstances, work is irregular and uncertain; as a rule, the diet of the labouring classes is defective in quality, and, when there is scarcity of work, it must also be deficient in quantity. That fitful and uncertain employment, with its attending circumstances, has not proved more baneful, must be ascribed to that conservative power of the system, by which it is able in a remarkable manner to accommodate itself to inadequate or insufficient food; nevertheless, destitution, by its depressing influence on the mind, and its gradual undermining action on the body, exercises a prejudicial influence, and acts as a powerful predisposing cause of fever.

But whether labour be abundant or scarce, whether food be dear or cheap, it must be admitted that there is at all times a large class in indigent circumstances, almost amounting to destitution, and consequently we have this predisposing cause of fever always amongst us. Nearly all the cases admitted into the Fever Hospital are from the labouring classes, and I found, on investigating the circumstances of a great number, that 31 per cent. represented themselves as being very poor—*i. e.*, poverty *per se;* that in 22 per cent. of the cases poverty was associated with overcrowding; in 2 per cent., with nuisances; in 7 per cent., with intemperance; and in a few cases the whole were combined, so that in 70 per cent. of the cases poverty might be registered as a predisposing cause.

The origin of the late epidemic has been ascribed to a large increase of destitution in the town in 1861. The evidence in favour of that opinion is not conclusive to my mind, for, if such existed, it was not so pronounced as to excite general attention at the time, and fever did not assume an epidemic character until the latter end of 1862.

2. *Intemperance.*—Habitual intemperance was not acknowledged to exist in many of the cases admitted into the Fever Hospital. This was probably owing in great part to the patients being chiefly labourers, and not of the artizan class. Intemperance *per se* was admitted to exist in 6 per cent. of the cases only; intemperance associated with poverty in 7 per cent.; with other predisposing causes in 3 per cent.; so that the whole number amounted to but 16 per cent. The proportion would have been greater had all the patients been adults; but as many were children and young persons, in whom the vicious habit of drinking to excess could hardly have been formed, it is not surprising that the average was so low, even when taking into consideration the enormous amount of drunkenness which prevails. There can be no doubt but that habitual intemperance not only renders the individual peculiarly obnoxious to the influence of contagion, but also materially lessens his chance of recovery when overtaken by fever.

3. *Over-crowding.*—This has been looked upon as the most

baneful and most prolific of the predisposing causes of fever, and it was with no small amount of interest that the numbers of those patients who avowed its existence in their families were summed up. It was found to prevail in 32 per cent. of the cases admitted into the Fever Hospital—viz., *per se*, in 2 per cent., in conjunction with poverty in 22 per cent., with other predisposing causes in 8 per cent. This would probably give but an approximate idea of the extent of the evil, and of its influence as a predisposing cause of fever; for what might be considered excessive over-crowding from a sanitary point of view, would not be so regarded by those, upon whose testimony we depended, who were practically unacquainted with a different kind of domiciliary arrangement. It would *a priori* have been expected chiefly to prevail amongst the occupiers of court houses, but it was quite the reverse. It was observed principally amongst the occupants of what are called "front houses," and in the proportion of two to one. This would arise, no doubt, from greater facilities being presented by such houses for the sub-letting of rooms to different families, a practice very prevalent in the town. In addition to the overcrowding in the interior of the dwellings of the poor, there is another form prevailing, most pernicious in its effects, that of crowding too many houses on the surface of the districts they inhabit. The streets are narrow, and at short intervals are tapped by openings into narrow courts, so that every available yard of ground is built upon, and, consequently, the density of population in some parts cannot be exceeded in any town of the kingdom. With a few exceptions, the patients were admitted from those dense districts; they had, therefore, necessarily been subjected to the influence of a vitiated atmosphere.

4. *Nuisances.*—Under this head are included imperfections of sewerage, giving rise to unwholesome smells. The complaints on this score were very few, amounting in the whole to 8 per cent. In no case could it be referred to as a predisposing cause *per se*, in 2 per cent, bad smells in the house co-existed with poverty; in 5 per cent, the two were associated with over-crowding; and in 1 per cent with intemperance.

Some years ago, great and general satisfaction was expressed

at the diminished rate of mortality from diseases of the zymotic class.   Upwards of two millions sterling had then been expended for sanitary purposes, exclusive of more than a million and a half for an improved water supply.   The registrar general, in referring to this reduction in the Liverpool death rate, stated that the expenditure had "borne ample fruits," the typhus death rate having fallen at the time to a fraction under one and a half per thousand, per annum, of the inhabitants.   That encomium may surely be reiterated at the present time; as it was found, during the late epidemic of fever, that only in conjunction with others, were morbific agencies, such as come under the control of the municipal authorities, known to exist as predisposing causes of the disease in the cases admitted into the Fever Hospital.

It has been the practice to measure sanitary work by the amount of zymotic disease prevailing.   In other words, the predominance or otherwise of diseases of this class has been the gauge of the completeness or imperfection of such operations. Now, while fully appreciating their value in promoting and improving the social and physical condition of all classes, rich as well as poor, it must be confessed that, to set up such a standard, is to forget the existence, or to deny the power, of other predisposing causes.   These latter were in the ascendancy during the late epidemic, which probably would not have been the case had sanitary work been neglected.

5. *Slovenly habits of the poor.*—It is to be deplored that the habits of the labouring classes should be of that character as to warrant their being ranked among the predisponent causes of disease.   I have visited their dwellings in some of the lower districts of the town, and observed, in some houses, such an amount of disorder and uncleanliness, such accretions of dirt and putrescent animal and vegetable matter, as would baffle description.   The constitutions of the people inhabiting such dwellings, would be materially impaired and enfeebled, and they would therefore be peculiarly liable to be overtaken by fever.

While reviewing these various predisposing causes, and inquiring into their relative value as fever producing agencies, one cannot but notice the significant fact, that those causes, such

as emanations from sewers, &c., which are subject to the direct control of the municipal authorities, were of small gravity during the late epidemic, but that intemperance, overcrowding, and poverty, causes which are not easily dealt with, and cannot be so effectually suppressed, were in operation in 64 per cent. of the cases which were investigated. These unfavourable elements are always present in a large community like Liverpool, varying in degree from year to year, according to the abundance or scarcity of food and work"; but, as far as I have observed, there has been no marked difference in the general and ordinary condition of the working classes for the last ten or fifteen years. If there has been any change, I think it is a change for the better in regard to employment, but poverty and intemperance are not materially lessened. There have been seasons of temporary distress in the spring of the year, when easterly winds have continued an unusual time ; and there was a scarcity of employment in 1861, and the earlier part of 1862, owing to a diminution in the cotton import. It must, however, be borne in mind that there was no increase of fever during the said periods of temporary distress,—periods extending over a few weeks at a time ; neither was there an increase worth recording during the season of 1861 – 62, when the cotton porters were but indifferently employed; but that it was after work had become more abundant, i.e., towards the end of 1862, that fever notably increased.

If this be a correct representation of the state of the working classes, previous and subsequent to the late outbreak of fever,—of what may be called their normal condition,—it would be erroneous and unphilosophical to ascribe that epidemic to an intensification of any single predisposing cause, seeing that those which prevailed, and were well recognized, were adequate to account for it ; unless that increase was so manifest as at once to convince all that there was a peculiar relation between that increase and the fever generated. If it be objected, however, that the above is not a correct description of the working classes, nor of the antecedents of those who were admitted into the fever hospital, I must have recourse to another source, for proof of its general accuracy. This is furnished by the reports of our medical officer of health. These

establish the fact, that a high rate of mortality (irrespective of fever) uniformly prevails in the town, undoubtedly the result of those influences, producing a low standard of health, which at other periods, and under different circumstances, would be predisposing causes of fever.

I would sum up my views of the *rôle* which predisposing causes play in an outbreak of fever in the words of Dr. Alison, quoted from his pamphlet on the " Epidemic of Fever in Scotland in 1843, and its connection with the destitute condition of the poor," merely inserting *predisposing causes* for the term *destitution*, which he used as relating to the subject he was then writing upon. " But, in accordance with the principles which I have stated above, and which are exactly the same as stated formerly, it will be at once perceived that the relation which I maintain to exist between predisposing causes and fever, is not simply that of cause and effect, but that of *predisposition*, favouring the effect of another cause, which is essentially variable. Where predisposing causes exist, they prepare victims for fever, but the fever ' *bides its time*.' It springs from a specific contagion (at least that is the only source from which we are sure that it springs) which rises and falls in intensity from various causes, known and un-known; but when, in the course of these fluctuations, it invades a community where there is a large amount of misery and des-titution (predisposing causes), its extension there is, *cœteris paribus*, much greater than elsewhere."

Having thus adverted to the predisposing causes, I shall now briefly refer to the exciting cause which has predominated during the late epidemic, viz., contagion. It would be out of place to enter upon the inquiry as to whether fever may be spontaneously generated; and, farther, it would be of no practical utility; for there is no evidence, or even suspicion, of such origin, during the late outbreak, and it is improbable that such a concurrence of circumstances, or such an aggravation of predisposing causes, has arisen, or will arise, here to originate the disease *de novo*. I shall therefore pass on to the consideration of the exciting cause, the communication of the specific poison from one labouring under the disease to a healthy person. This might occur, and frequently

does occur, without the interposition of the predisposing causes, as observed in the cases of individuals in the better ranks of life who have contracted the disease, and whose position would elevate them beyond the influence of such predisposing causes as destitution, overcrowding, and filth; but the usual mode, as proved by the inquiries which I instituted, is through the medium of the predisposing causes; at all events they were in operation in a large proportion of my cases. These prepare a soil in which the germ of fever readily fructifies; while they might not originate the specific poison, they might and would favour its development and dissemination.

Demonstration of the importance and influence of contagion, during the late epidemic, is found in the following report. In 68 per cent. of the cases admitted, there had been exposure to contagion through members of their families being affected. In 26 per cent., fever was known to prevail in the same courts, or in the adjoining houses in the street. Two per cent. were sent from lodging houses, where there was no evidence of contagion; and 4 per cent. were ignorant of having been in contact with fever cases. There is evidence then to prove that 68 per cent. of these cases had contracted the disease through direct intercourse with other members of the same household; and that 26 per cent. had lived in an infected neighbourhood.

To the profession, as being familiar with the contagiousness of typhus and with the social habits of the poor, the opinion that 94 per cent., at least, had taken fever by means of contagion, will not be deemed unfounded; and a suggestion that the remainder caught it in the same manner, though the source was unknown, might not be considered hyperbolical.

The opinion that the patients admitted from infected districts had been exposed to contagion, and that the morbid poison had thus been transferred from the sick to the healthy, is grounded on the following characteristics of the poor.

1. Their sympathy, or, possibly, their curiosity or dread of being deemed unneighbourly, which prompts them, regardless of consequences, to visit their sick neighbours, fever cases as well as others; a commendable practice, no doubt, if adopted with dis-

cretion, but fruitful of danger when indiscriminately exercised. The reverse is the custom of the better classes when fever is known to exist among their friends, and evil consequences are thus averted.

2. The practice amongst convalescents of visiting friends. In their weak state, they "take the air," are accosted in the streets, and call upon their acquaintances, while carrying about their persons the fomites of the disease.

3. The intercourse of children. This takes place most probably after convalescence is somewhat advanced. Children living in the same court, or occupying adjoining houses in the low districts of the town, would naturally be acquainted with each other; the healthy would associate with the sick during recovery, and thus be liable to contract the disease, or convey the morbid poison to members of their families more susceptible than themselves. I have been led to think that the fever is sometimes communicated to families by this mode, from having occasionally observed that a child has been the first to be attacked with fever, and that the disease has subsequently prostrated all the other members.

With fever always existing among us, and with its causes, predisposing and exciting, always in operation, the question naturally presents itself, How is it that fever is so variable in extent, at one time reduced to a minimum, at another so rife as to be called epidemic? When the conditions necessary to its extension and development are persistent and tolerably uniform, why is the disease not equally uniform in amount? This is a problem which cannot readily be solved, and yet some explanation should be attempted. The public are apt to search for an elucidation in drains and middens, in filth, over-crowding, poverty, and intemperance, the predisposing causes. We find, however, that these do not vary (it is very certain that sanitary nuisances are much less potent than formerly), and the exciting cause does not fluctuate in its efficiency and power. Some attribute the variation to a *pandemic* influence, which appears at intervals of time; but this is an undetermined point, and a very questionable theory.

I am disposed to think that the explanation is to be found

in the *subjects* of the disease, and not in the aggravation of the causes, or in a supposed but undemonstrated pandemic influence.

This opinion is based on the fact that in the course of a few years (after an epidemic wherein a large proportion of the impressible inhabitants would be affected, and consequently be proof against future attacks) a new generation of *susceptible* subjects springs up in the lower parts of the town, composed of infants and young children grown up to an age more obnoxious to the poison, of immigrants who had not previously been exposed to the influence of contagion, and of others who might have been either less susceptible or less exposed to the influence of the morbid poison during a previous epidemic, succumbing to it at a later one.

With regard to *age*, it is generally acknowledged that, while other zymotics are principally diseases of infancy and early childhood, typhus is observed chiefly among adults. The following table of the ages of the patients admitted into the Fever Hospital confirms that view.

Age.	Per cent. of Admissions.
Under 5	1
From 5 to 10 . .	11
,. 10 to 20 . .	36
,, 20 to 30 . .	27
,, 30 to 40 . .	15
,, 40 to 50 . .	4
Above 50	6

It is, therefore, manifest that after a few years' respite the children would arrive at an age when they would be much more liable to the action of the typhus poison.

I have not ascertained the proportion of *immigrants*, but have no hesitation in assuming that a large majority of those admitted between the ages of fifteen and twenty-five were of that class; *a priori*, I would judge that such would be about the age they would have attained on arrival here; hence their susceptibility.

With reference to the third class, it is not unreasonable to suppose that many who at one time were not susceptible might,

through changes of circumstances and residence, and by prolonged exposure to the undermining and debilitating influence of the predisposing causes, become more likely at a future time to succumb to the exciting cause of the disease.

The above is not offered as a complete explanation of this *vexata questio*. The view I have taken is strongly corroborated by the ages and character of the patients which have come under my care; and these may be taken as a fair representation of what would be observed in any epidemic of fever. The table of ages differs slightly from the record of ages of the London fever hospital. The proportion under ten being smaller, and above forty being greater, in the London hospital; but this may in some measure be accounted for by the fact, that some of the cases admitted there are paid for as private patients.

The principle of *susceptibility of the subject* will explain not only the prevalence of fever at certain cycles or periods of time, but of other infectious diseases, such as morbilli and scarlatina, included in the class of zymotics. These prevail at all times to a certain extent; but, with a periodicity which may almost be calculated, they increase so as to become epidemic. It is true that their orbit is more circumscribed, and their epidemic appearance therefore more frequent, but this is owing to their partial limitation to the young; whereas typhus is not so restricted in its course, because it is chiefly observed among those who are in the prime of life. While the former are essentially diseases of childhood, the latter is a disease of adolescence.

Whether this explanation of our late epidemic be satisfactory and conclusive or not, it seems to me at all events to be in accordance with the fact, that the sanitary condition of the town is not deteriorated, with the circumstances of the subjects who become a prey to the disease, and with its occasional, if not periodical, augmentation and extension.

It would be well if the measures to prevent or mitigate epidemic typhus could be as readily applied, as the causes of its dissemination are ascertained. In my previous remarks I have referred to the value of the predisposing and exciting causes, and to the condition of the subjects, as exercising their several

parts in the spread of the disease. It is true that the two latter may and often do act independently of the former, but as a rule their influence is brought to bear upon those who have been subjected to the sway of these predisposing causes.

The *subject* is innately susceptible of the poison of typhus, and as yet no means have been discovered, as vaccination in variola, by which that susceptibility can be eliminated. Some of the predisposing causes have been energetically and successfully contended with by the municipal authorities, but there are others, unfortunately too rife, which are ineradicable by sanitary legislation. I allude to the social vices, and household dissoluteness, which have attained to such magnitude as to defy any power as yet brought to bear upon them. Some good might be accomplished in this direction, by appointing men of prudence and energy as inspectors over small and manageable districts; men interested in their vocation, who by their conduct would secure the respect of the poor and improvident, and whose encouragement of the one, and remonstrance with the other, might be attended with favourable results. With regard to contagion, the exciting cause of typhus, I must state my belief that more might be accomplished than has hitherto been effected, in checking its prolific agency. The predisposing causes would be almost, if not entirely powerless, and the inherent liability of the inhabitants would be of no avail, if this, the leaven, were not in operation; and it appears to me that the extinction of this is the only feasible method by which the plague can be arrested.

To effect this desirable object, a more complete system of isolation and disinfection should be organised than has ever been attempted; and this might be secured by energetic and harmonious co-operation on the part of the municipal and parochial authorities. It would involve much labour and considerable expense at the outset; but, apart from the momentous interests which are at stake, the end would *financially* justify the means.

OBSERVATIONS ON LITHOTOMY,

(BEING THE SUBSTANCE OF TWO CLINICAL LECTURES DELIVERED AT THE ROYAL INFIRMARY,)

By E. R. BICKERSTETH, F.R.C.S.E.,

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GENTLEMEN,

You have lately witnessed a case which proved fatal two days after lithotomy; and the circumstances attending the operation, and observed on post-mortem examination, were so peculiar, that I deem it prudent on this occasion to depart from our ordinary course of clinical instruction, which consists simply in demonstrating disease as commonly observed, and speculate on some of the casualties occasionally met with in the course of an extensive experience. The successful and brilliant results attending our operations for stone are the most pleasant, and to junior students the most instructive, for contemplation; but the surgeon very generally finds he derives instruction more useful to himself and his future patients, by careful study and observation of the circumstances attending his unsuccessful cases. By this means alone can he hope to escape the dangers and risk of operative practice, and learn how to overcome them when unavoidably encountered. It is a duty we owe to the public, and those who place their lives in our hands, that every case, and specially those that terminate untowardly, should receive our full and critical examination. Might the result have been otherwise? Might not the patient have recovered, or life at least been prolonged, had such and such been done, or this and that left undone? It is a painful investigation, but it is one that the conscientious surgeon must hold with himself very often.

M. K., aged 37, a sickly, pale, anæmic-looking man, was admitted in April, 1867, suffering from all the usual symptoms of stone, in an aggravated form. He had complained, more or less, for upwards of three years, but during the last ten months his general health had failed, and he had been completely incapacitated from work. At the time of his admission he was unable to retain his water for more than five minutes, either night or day. It was of very pale colour, specific gravity 1007, mixed with pus, neutral, and containing particles of flaky matter. On microscopic examination, no tube casts could be found, but a small quantity of albumen was frequently detected on the application of heat and nitric acid. On examination with the sound, which however caused such pain that chloroform was required, the bladder was found much contracted and its walls unusually rigid and rough. Sometimes the presence of a small stone was readily detected, but at others, although every care was taken, it was impossible to be sure of its presence, and this was the more remarkable, inasmuch as *during* the examination it was occasionally struck, and then again could not be found. The examinations were repeated upon several occasions, at intervals of four or five days, and each time were followed by an exacerbation of suffering and an increased quantity of unhealthy matter in the urine. By the use of warm baths, rest in bed and the mineral acids with pareira, the urine somewhat improved in appearance, but it continued persistently of low specific gravity and always contained flaky matter. After a while, he was able to retain it for about three quarters of an hour. No evidence could be detected of prostatic enlargement, but the gland felt thickened and unusually fixed and rigid when examined by the rectum. The question of operation under these circumstances was carefully considered. Lithotrity was evidently inadmissible, and the prospects of recovery after lithotomy appeared more than doubtful. The character of the urine and the man's cachectic and cadaverous appearance rendered it probable that the kidneys were not in a healthy condition; but, at the same time, as albumen was not constantly present in the urine, and as it appeared possible that the symptoms might arise from the diseased condition of the

bladder alone, the removal of the calculus afforded the only prospect of relief.

On the 28th of May, the operation was performed. After the patient had been placed upon the operating table, a careful search for the stone with the sound was made, and again, as before, it was occasionally felt. Sufficient evidence was obtained to justify the operation, but the position of the calculus could not be accurately ascertained. The curved staff being introduced, the ordinary incision was made and the prostate divided, so as to admit the end of the finger into the bladder. And now the difficulties of the operation began. I was unable to feel the stone with the finger, or with the forceps, which were used in the ordinary way, and appeared to pass fairly over the whole surface of the contracted bladder. Repeated careful search was made, but with no other result. I felt convinced that the point of my finger was fairly past the prostate, and in the cavity of the bladder, yet all my endeavours to find the stone failed. Having used every effort which I thought justifiable, I requested my colleague, Mr. Hakes, to examine the bladder, and he, as you observed, succeeded, after prolonged endeavours, in reaching the stone, which was found in another cavity above and behind that in which I had been exploring. Being small, it was then readily removed, but not until the parts had been subjected to constant manipulation for at least twenty-five minutes. The patient was removed to bed in an exhausted condition, and never rallied fairly from the effects of the operation. Vomiting commenced the same afternoon; pain over the lower part of the abdomen was constant, and the patient gradually sank, and died on the third day.

You may readily conceive how anxious I was to obtain an examination of the body, in order to ascertain the cause of the great difficulties which had presented themselves, and which doubtless led to the speedy fatal termination of the case, but the consent of the friends could not be obtained, and, consequently, I was obliged to content myself with simply removing the pelvic viscera and one kidney by enlarging the perineal wound. The condition of the bladder was very peculiar; its walls greatly thickened, and the mucous coat thrown into numerous deep rugæ, and everywhere ulcerated. Its cavity appeared to be divided into two distinct

compartments, by an enormously hypertrophied muscular band, which passed across its floor, between the orifices of the ureters. The upper cavity, or bladder proper, capable perhaps of containing a bantam egg, was formed by the hypertrophied textures before mentioned; the lower one was bounded by broken down and ulcerated tissues, the result of disorganisation of the posterior part of the prostate gland; and the further part of this cavity was separated from the general cavity of the abdomen, by little more than the peritoneum. This membrane showed evidences of injury, for traces of recent inflammatory action were observed on its internal surface. Numerous small abscesses existed in the remaining portion of the prostate, and its texture generally was very friable. The left kidney was pale and flabby, but, on section, did not present any characteristic appearance of fatty or amyloid degeneration. The ureters were enlarged and thickened.

FIG. 1.

BLADDER AND PROSTATE SEEN FROM BEFORE.

a, Upper cavity.
b, Muscular ridge between the ureters.
c, Lower cavity.

From the drawings and the description of the condition of the bladder, you will see the difficulty in reaching the stone is readily explained. When the sound was introduced by the urethra, it passed directly into the lower cavity behind the prostate, where no stone could be found, but by keeping the instrument well against the upper wall of the urethra, its short, sharp curve permitted it to mount over the muscular bar on the floor of the bladder and enter the upper cavity, where the stone was found. But with the staff this was impossible; its large curve incapacitated it from passing over the bar into the upper contracted cavity, rigidly fixed and drawn up, as it was, behind the symphysis. Thus, the finger, guided by the staff, entered the lower pouch, and I failed to reach the part where the stone rested.

FIG. 2.
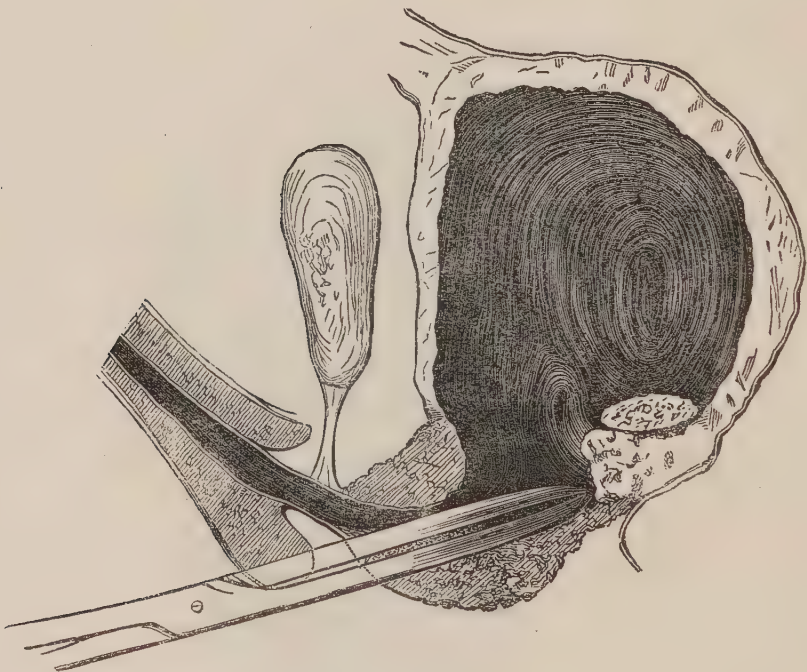
VERTICAL SECTION OF BLADDER AND PROSTATE,
Showing the two cavities, the muscular ridge and the position of the stone.

If the precise condition of the parts had been known beforehand, of course the difficulty would have been overcome much more readily than it eventually was, and the disturbance and injury consequent upon the prolonged manipulations, which

doubtless increased the hazard of the operation, would have been proportionately less. The lesson, then, which we may draw from the case is this;—to examine the patient with the utmost care before operating, and, if possible, be satisfied regarding the condition of the parts and the position of the stone. But, you may say, the previous examinations were repeatedly and carefully made in this case, and an opinion, not altogether incorrect, expressed regarding the state of the bladder. I was not aware, however, at the time, that such a condition as we met with ever existed, but if you read the excellent observations on lithotomy by Charles Bell, you will find he mentions this abnormal formation of the bladder, and describes it as due to an hypertrophy of the muscles of the ureters, consequent upon their long-continued irritation. He gives also a drawing not unlike that I have shown you, and which represents very accurately the parts in this case. Here, however, we had this additional complication, that the walls of the lower cavity were thinned and disorganised from disintegration of the posterior part of the prostate.

There is not much danger in simply opening the bladder by the ordinary incisions of lithotomy. The risk of the operation is from the subsequent disturbance and injury to the parts in searching for and extracting the calculus. I am so well satisfied of this that I have on some occasions operated when I have not been by any means thoroughly convinced that a calculus existed, and where, all other means failing, I have thought that the rest afforded to the bladder by an incision through its neck, permitting the constant escape of the urine without any muscular contraction on its part, might act beneficially. Let me mention a case.

J. E., aged 45, suffering from all the usual symptoms of calculus, but in whom I could not detect a stone, was under my care for many months about ten years ago. His urine was constantly purulent, and often contained blood. He was unable to retain it for more than half an hour either night or day. All the ordinary methods of treatment failing to do good, and the man becoming emaciated and exhausted from constant suffering, I proposed this operation, to which he readily con-

sented. I did not find any stone, but the bladder was greatly thickened and contracted. I introduced a lithotomy tube, and retained it in the incision for a week, and afterwards, by passing it through the incision every second or third day for some weeks, I prevented the wound from closing. Immediate relief to his distressing symptoms ensued, and, to my great delight, as the fistulous opening at length gradually contracted, the urine passed by the urethra without pain, and two months after the operation he was able to retain his water for two hours, and sometimes longer. The patient thought himself cured, and I lost sight of him till a few months ago, when I learnt that for several years he had experienced little or no trouble with his bladder. Curiously enough, a few months ago a stricture of the urethra formed behind the bulb, and many of his old symptoms returned. The stricture has fortunately yielded to the regular use of the bougie, and now again the patient is restored to comfort. I performed a similar operation on an elderly man not long afterwards, and found the neck of the bladder occupied by a fungous mass, which was evidently of a cancerous nature. No permanent benefit resulted, but the patient was immediately relieved from his previous distress, and continued for a long time in comparative ease.

We occasionally meet with cases of soft calculi, where it is impossible to elicit the characteristic signs with the sound, such as we are taught alone justify lithotomy, and yet where, if this operation were undertaken, relief might be afforded. Many years ago I attended such a case, in consultation with Dr. Barrett. The operation was not performed, and after death, which occurred some months subsequently, we found a soft gelatiniform and fibrinous mass, the size of a walnut, in the bladder. It was so soft that it yielded readily to pressure, and upon allowing it to dry it shrivelled so as not to be larger than a filbert. On making a section, it appeared to consist of inspissated mucus containing grains of calculous matter. The bladder in this case was much thickened and diseased, but there was no sufficient disease of the other organs to account for death. Three or four years ago a boy was admitted

into the Infirmary, under the care of Mr. Long.   He had an enormous prolapse of the rectum, which was in a state of absolute gangrene.   From the history of the case, it appeared that he had had difficulty in passing water and the ordinary symptoms of calculus for many months before.   Examination with the sound, however, failed to give any evidence of a stone.   In a few days the child died, and upon *post-mortem* examination a stone was found in the bladder, as large as a damson and as soft as putty, so that the impress of the finger remained upon it when pressed.   On cutting through this soft substance, which was about half an inch in thickness, a small urate of ammonia calculus was found in the interior.   Some years ago another very similar case occurred in my own practice.   It was that of a boy who had every symptom of a stone, but in whom repeated examinations gave no clear indication of its presence.   When the sound was introduced I could feel, with my finger in the rectum, some apparent thickening in the posterior part of the bladder.   I operated, and extracted a mass precisely similar to that just mentioned, and the child recovered.   The occasional occurrence of such cases goes far to show that the bladder may sometimes be justifiably and beneficially opened, even when the existence of a calculus is by no means certain.   But in saying this I beg you will understand that I do not advocate recourse to such an operation unless every other means of affording the patient relief has failed.

The operation of lithotomy has always been one of peculiar interest to the surgeon, and, without doubt, much of this interest has been fostered by the varying circumstances attending its performance and its results; circumstances which, though sometimes shrewdly guessed at, can seldom be foretold with accuracy. Thus, you have often seen the operation completed within a minute, everything being apparently most simple; while occasionally, as in the case which has suggested these remarks, though by the uninitiated nothing unusual has been anticipated, great difficulties have arisen, and fully twenty minutes or more have been spent before the stone could be removed. Lithotomy, if quickly and correctly performed, is usually successful, and in

proportion to the time occupied the difficulties and the dangers of the operation increase. It is desirable, then, to operate quickly; yet there is no operation in which it is so necessary to proceed cautiously, remembering always that the parts necessarily injured in opening the bladder, and during the extraction, will bear only a very limited amount of irritation, and that any unnecessary disturbance of these textures will give rise to inflammation, which, in nine cases out of ten, ends only in death. "Make haste—slowly" should be constantly in your mind. Let me explain myself more fully; and first you will understand that I am describing the lateral operation, as practised by Cheselden, and, with few exceptions, always adopted in this hospital.

After the patient has been placed in the proper position, and the curved staff introduced fairly into the bladder, it should be confided to a trustworthy assistant. He should hold it steadily and firmly, neither hooked up under the pubic bone or pushed down upon the rectum. The handle of the staff should be held exactly in the median line, almost vertically, but inclined downwards (or towards the feet of the patient), about an inch from the exact vertical position. This is a point of material importance, for otherwise the point of the staff might not, in the adult subject, fairly enter the bladder. My meaning will be at once understood by a glance at this diagram, Fig. 3.

FIG. 3.
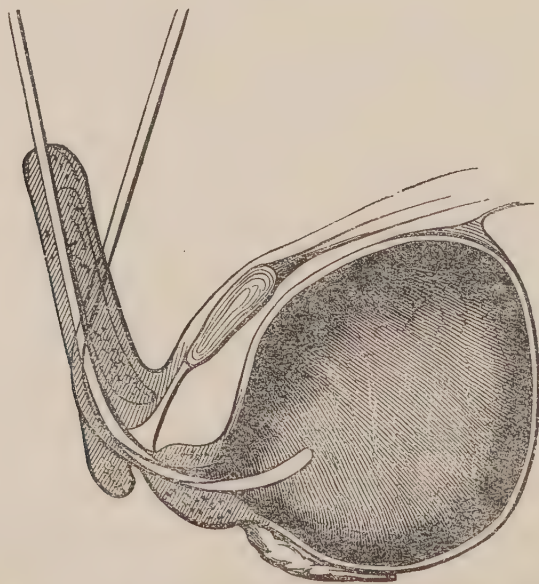
TO SHOW ANGLE AT WHICH STAFF SHOULD BE HELD.
The shaded staff, being wrongly held, is seen not to enter the bladder properly.

It is not desirable to have too much urine in the bladder at the time of operating. An ounce or two is enough, and will facilitate the future stages of the operation. More would probably embarrass, by increasing the area in which you have subsequently to search for and secure the stone. Moreover, the sudden collapse of a distended bladder, at the moment it is opened by the knife, would very likely cause it to fall in folds upon the calculus, and prevent its ready detection. If the patient, then, can retain the urine for an hour or an hour and a half before the operation, it is enough. The bowels, of course, have been cleared by a dose of oil on the previous day, and the rectum washed out by a simple enema an hour or two before the operation.

So much regarding the preliminary steps, and they are of no small importance. Now I will mention the chief points to be attended to in the subsequent stages of the operation, which, for convenience of description, may be divided into three periods—i. e.,

> 1st, Opening the bladder.
> 2nd, Seizing the stone.
> 3rd, Extracting it.

1st. The cutting part of the operation ought not to present any difficulty, to one who has the ordinary use of his hands and a correct knowledge of the anatomical disposition of the parts. These parts are not liable to any variations that need influence the surgeon when lateral lithotomy is determined on. The artery of the bulb may be given off at a higher or lower point than usual, or may not arise at all from the internal pudic. When arising low it is not a matter of material importance, for although this renders the artery more liable to injury, I have never known any serious difficulty in securing the vessel when cut, if only there is a sufficiently free external incision ; but the latter occurrence is more serious, because the hæmorrhage which then results is altogether beyond the surgeon's control. The artery then arises from the internal iliac, and, coursing along the side of the prostate gland, is terribly exposed to incision when the bladder is opened. Fortunately this variety of distribution is very rare. I have met with it but once. The patient was a Spaniard, whom I cut for stone in Erskine-street Hospital. Plugging the wound deeply round a gum-elastic tube arrested external bleeding, but

it bled on into the cellular tissue of the pelvis, and after death, which occurred on the fifteenth day from cellulitis and peritonitis, I found large clots in the position I have mentioned, and the arteries arising on both sides from the internal iliacs. The prostate gland is sometimes enlarged, but never forms any impediment in this part of the operation.

The chief points to attend to are to have the patient well placed on a high table, with the buttocks slightly raised, exactly of equal height, and square to the table. Of whatever length you make your external incision, and it should seldom be less than three inches in the adult, let one-third of it only be in front of the anus. The knife should be held firmly but lightly, the forefinger resting on the back of the blade, the end of the handle steadied and supported against the centre of the palm, and no change from this position need be made till it is finally laid aside. The first incision, if well planned, should at once divide all the resisting textures, and admit the forefinger of the operator's left hand into the cellular space behind the triangular ligament. Here he will feel the staff, running nearly parallel with his finger, and just above it. The finger nail is then to be pressed gently into the groove of the staff at the furthest point at which it can be reached—i. e., just in front of the prostate. The point of the knife, supported by the finger nail, and protected by the groove of the staff, is then made to open the urethra and enter the groove; the blade is turned nearly sideways, and pushed steadily onwards along the groove, till it is felt to have entered the bladder. Then the knife may be removed, and the finger, which has rested in the wound at the point where the urethra was opened during this deep incision, is passed along the groove into the bladder. A careful estimate should now be made regarding the size of the incision you have made through the prostate and neck of the bladder. If the finger feels embraced at any part, as if surrounded by an elastic and unyielding india-rubber band, you may feel sure you have not incised the whole length of the prostatic urethra. Probably the elastic ring surrounding the neck of the bladder has not been cut. Manipulation with the forceps would then be dangerous.

It would lead to the mucous lining of this vitally susceptible part being extensively detached and lacerated, and fatal inflammation and sloughing would almost certainly follow. The remedy is simple. Retaining the finger grasped as it is by the prostate or neck of the bladder, you must slide up flatways upon it past the contraction a narrow, straight, probe-pointed bistoury, and then by simply turning its cutting edge towards the part that should have been cut, the contraction is felt to give way, and the part yields readily to gentle pressure with the finger, and may be dilated to the necessary extent without danger.

There is a mistake which the inexperienced surgeon is extremely apt to commit while making the deep incision, and as I have known it occur on some occasions, and be followed by the most disastrous results, I cannot too strongly warn you of it. It occurs most frequently in the cases of children, in whom the bladder is more an abdominal than a pelvic viscus, and is consequently situated much higher than in the adult subject. I committed the error I allude to myself in my first lithotomy, and therefore have the less scruple in speaking of it.

Fig. 4.
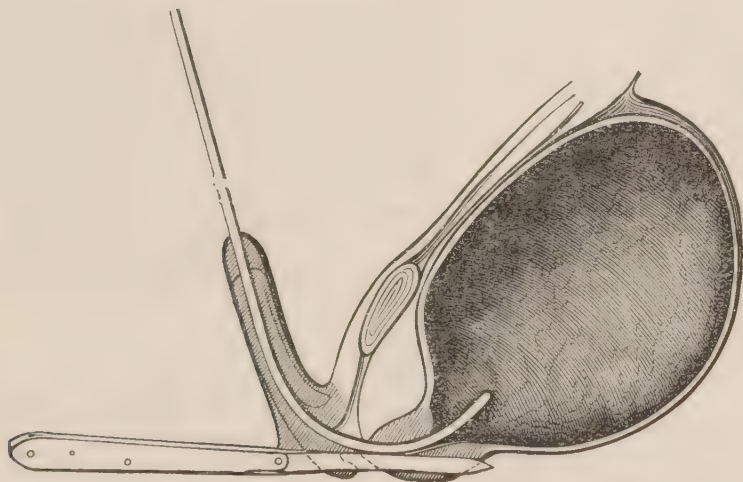
TO ILLUSTRATE THE DANGER OF NOT DEPRESSING THE HANDLE OF THE KNIFE IN CHILDREN.

Point of knife having left groove in staff is seen passing behind the prostate.

After the urethra has been opened, and the point of the knife lodged in the staff, the surgeon is apt to fancy he is perfectly safe in pushing it onwards, as long as he feels the blade is fairly in contact with the groove. He forgets that he is cutting on a convex surface, and that unless he depresses the handle of the

knife as he pushes it on, the point soon leaves the urethra and cuts into the cellular tissue behind the prostate, failing altogether to open the bladder. Here the operator works away with his finger, and soon succeeds in making a space which he fancies is the bladder. Of course, he cannot find the calculus, and if unfortunately his staff has been withdrawn, he probably never gets into the bladder at all. I could tell you of some very remarkable mistakes I have seen arising in this way, but it is enough that I have warned you how to avoid the error.

Depress the handle of the knife more and more as you push it on, till at the termination of the incision, it is nearly against the lower end of the external incision. A moment's

FIG. 5.
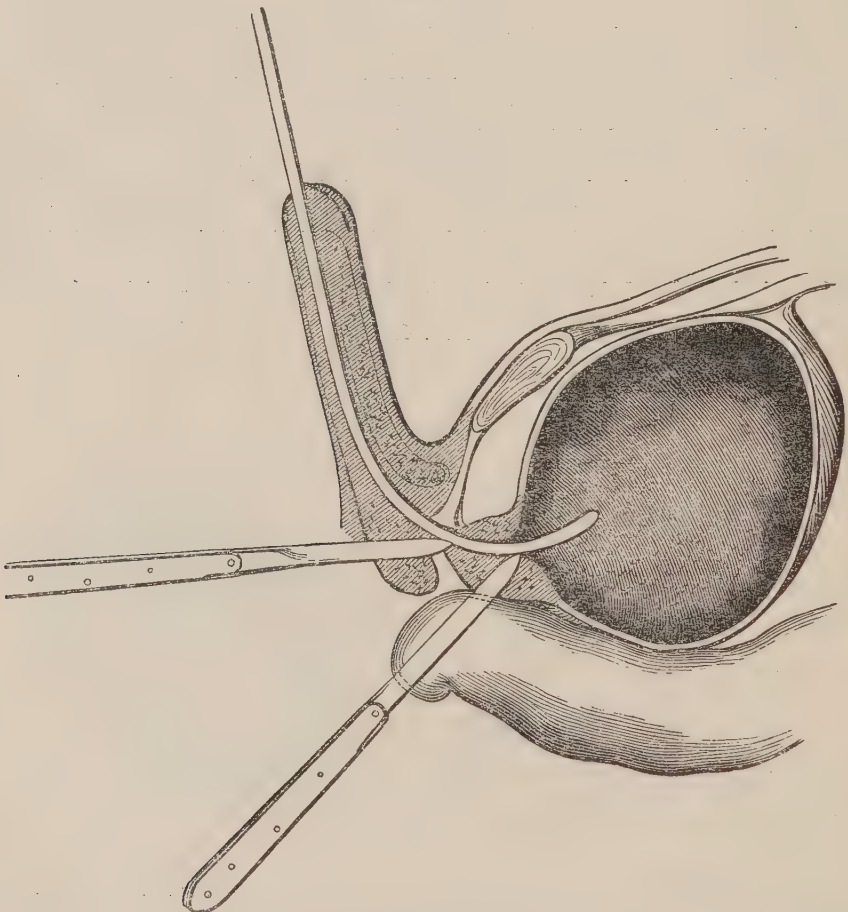
TO ILLUSTRATE THE DEPRESSION OF THE HANDLE OF THE KNIFE WHILE
MAKING THE SECTION OF THE PROSTATE.

reflection will inform you that the left lobe of the prostate is divided more or less, according to the degree you have depressed the handle of your knife in making this, the deep incision. Much has been written on this subject, some operators

advocating its free division, others limiting it as much as possible, from a morbid apprehension that division of the fibrous capsule enveloping the prostate would certainly lead to fatal extravasation of urine into the cellular tissue of the pelvis. But it is evident this capsule must be opened under any circumstances at the apex of the gland, if the prostate is cut at all; and the increased risk arising from a slightly extended incision is not to be compared with the danger of laceration, which is otherwise almost certain to occur during the extraction of even a medium sized calculus. If you take care never to allow the point of your knife to leave the groove in the staff while pushing it on, or while withdrawing it, you need not fear making too free an incision, though the handle of the knife has been depressed to the degree I have described.

Thus far, the operation offers no real difficulty to the practised surgeon, but the next stage, i. e., that of seizing the stone, is sometimes a matter of considerable trouble, even to one well used to the operation. The varying and the various positions that the stone may occupy, the possibility of its becoming displaced at the moment the finger, or still more so the forceps, enter the bladder, the different size, shape, and consistence of calculi,—all matters open to more or less conjecture, and materially influencing the readiness with which the stone may be seized,—render this stage of the operation one of anxiety. And when we think how much the embarrassment increases if the stone is not at once caught, and how much the safety of the operation is compromised by the repeated introduction of the forceps, and the consequent injury to the neck of the bladder, it behoves us to study well every means by which we can facilitate the object in view. A very eminent and successful surgeon, whose opinion I asked regarding the prognosis of a case I had just operated on, replied, "It is sure to do well; " adding, "I never knew a case to do otherwise, if the stone was caught and extracted by a single introduction of the forceps." Doubtless the experience of others could point to exceptions to this rule, but there can be no question regarding the general correctness of the observation.

The natural position of a calculus is on the floor of the bladder, very near its neck, and here we may generally rely on finding it.

This is the only position in which it can be readily seized, and the surgeon should rarely be satisfied unless he finds it in this situation, by careful sounding just before operating. My experience leads me to believe, that it is often pushed away from the neck of the bladder by the surgeon or his assistants sounding the patient with the staff, to obtain the desired information. This requires the greatest care in manipulation, in order to avoid the risk of displacing the calculus. Sometimes, after the staff has been put into its proper position, it happens to rest upon or against the stone. This may be regarded as satisfactory, when it occurs unsought for, but no attempt should be made to *obtain* this position, for the reasons just given. Let the situation of the stone be carefully ascertained with the proper sound, after the patient is finally placed in position, and then certainly avoid all movements of the body, or interference with the staff as likely to disturb it. And now, how best to seize the stone? The bladder has been opened; the staff is still held as originally fixed; the finger of the operator is pressed on in the hope of reaching the stone, and ascertaining its size, shape, and position. If this can be done, its seizure is comparatively easy; the staff is then withdrawn, any unfavourable position of the calculus rectified by the finger, and forceps adapted to its size selected. Up to this point, the neck of the bladder has been effectually plugged by the finger, and hardly any urine has escaped. If the patient is a child, and the stone small, the finger may rest upon it while narrow bladed forceps are introduced along the under surface of the finger, and made to grasp the stone, fixed as it is, by the finger. But if the stone is large, or even of average size, larger forceps are required to extract it, and these, it would be unsafe to introduce, or at any rate unsafe to manipulate within the bladder while the finger remained. Consequently the finger must be withdrawn at the moment the forceps enter. The forceps should be introduced with the handle well depressed, and the flat surface of the blades parallel to the direction of the deep incision, *i. e.*, obliquely. As soon as they have entered the bladder, the blades should be turned to one side, away from the point at which the stone has been previously felt, then pushed on till fairly within the bladder, and, being opened widely, a three-fold movement is now to

be made; the lower blade of the forceps, hitherto lying obliquely, is turned flat, the handles are raised, and they are brought to the direct line of the outlet of the pelvis. By this manipulation, the lower blade is made to sweep the floor of the bladder, and the stone can hardly fail to be secured by then closing the blades. But if this manœuvre should fail, or if it has been impossible to touch the stone with the finger before introducing the forceps, another plan must be adopted. The exact position of the calculus must be ascertained, by using the closed blades of the forceps as a sound, and carefully searching every part of the bladder till it is found. Then by turning the blades aside, opening them, and repeating the movement before described, the stone will probably be grasped. Every movement with the forceps should be made with the greatest gentleness and precision, and the operator should constantly bear in mind that the prostate gland is a fixed body; that the great danger of the operation is from unduly lacerating and disturbing its capsule of attachment, and that the only method of manipulating the forceps within the bladder with safety, is by making the prostate the axis of every movement.

Regarding the third stage of the operation, or the extraction of the stone, it is unnecessary that I should say much in this place. Now-a-days, patients rarely allow a calculus to gain any considerable size before submitting to the operation, and consequently the extraction is often simple enough. But if there is any resistance to its ready passage, I cannot impress upon you too strongly the importance of great gentleness. Gentle, steady traction, with occasional slight lateral movements, the handles of the forceps being always well depressed, will enable you to extract a stone with much greater ease and safety, than by violent efforts, injudiciously directed. There is great danger in this stage of the operation of detaching the mucous membrane from the neck of the bladder, and consequently every care should be taken. If the soft parts do not yield readily, it is better to confide the forceps to an assistant, while you divide any resisting fibres round the calculus, with a narrow-bladed probe-pointed bistoury, than to run the risk of injuring these important structures by tearing them.

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There are some points in the treatment after lithotomy to which we pay special attention, and these I may briefly allude to here. First :—the use of the gum-elastic tube, which we always employ, and from which we often derive great advantage. It establishes a regular passage along which the urine flows as secreted, and, by preventing the immediate adhesion of the sides of the wound, lessens the danger of urinary infiltration. You need not suppose that the urine passes exclusively through the interior of the tube. After the first few hours, most of it flows by its side, but still it does good by preventing primary union. In some few cases in which I have not used the tube, I have found it necessary to introduce the finger to re-open the wound, owing to the patient suffering from retention of urine, the consequence of the urethra being obstructed by inflammatory swelling, or by clots of blood. The tube may be removed in twenty-four hours after the operation in the case of children, or in forty-eight in adult patients. In the next place, attention to cleanliness is of the greatest importance after this, as after every other operation; and much advantage will be experienced by raising the head of the bed, so that the patient rests on an inclined plane, and the urine is prevented from wetting the upper parts of the body. By this contrivance, together with a sponge frequently changed, which should be wrung out of some antiseptic fluid, and placed against the perineum, the patient may be kept perfectly dry. Thirdly :— regarding the use of local applications, or of medicines. The less done the better, except under special circumstances. If there is much pain about the wound, lasting for more than a few hours after the operation, an opium suppository affords the best means of giving relief; but I am sure it is better to avoid its administration, unless the suffering is considerable and protracted. Where really required, opium is invaluable, but otherwise it is apt to derange the digestive system; and after all operations our first object should be to maintain the patient's digestive powers in as perfect a condition as possible. Sometimes patients complain of considerable pain over the lower part of the abdomen, and then hot fomentations over the part are most soothing and useful.

TABLE OF OPERATIONS PERFORMED AT THE LIVERPOOL NORTHERN HOSPITAL.

WITH REMARKS BY

JOHN BRADLEY, *House-Surgeon.*

THE cases enumerated in the following table were operated on at this Hospital, during a period extending over rather more than twelve months, viz., from June 6th, 1866, to July 25th, 1867. Most of the injuries came from the docks situated in the immediate neighbourhood of the Hospital, which furnish a constant supply of almost every variety of fracture and injury. In many instances, amputation had to be undertaken under unfavourable circumstances, especially in the case of thigh injuries, where, as the following table shows, the mortality was unusually great. A few notes have been added of the more interesting cases.

Operations.	Recoveries.	Deaths.	Total.
Amputation			
of thigh	1	5	6
at knee-joint	0	1	1
of leg	5	2	7
of foot (Syme's)	2	0	2
do. (Chopart's)	1	0	1
at shoulder-joint	3	2	5
through upper arm	2	1	3
through fore arm	5	0	5
Excision			
of knee-joint	1	1	2
of elbow-joint	1	1	2
Lithotomy	4	1	5
Herniotomy	1	2	3
Total	26	16	42

Amputation of the Thigh.

This operation has been performed on six occasions, once only with a successful result. The cases terminated fatally as follows. One an hour after the operation from the shock. In this case, the patient, aged 42, was suffering from a compound fracture of the fore arm, and an extensive scalp wound. The popliteal artery was torn through, the compound fracture of the leg for which the operation was performed being high up. One from the same cause, thirty-six hours after the operation. The patient was 50 years of age. One in five days, from exhaustion and irritative fever. One in seven days, from intense local inflammation passing on to mortification. And one in twelve days, from pyæmia. The operation with antero-posterior flaps, by transfixing the limb, is the one generally adopted.

Amputation at the Knee-joint.

This operation was performed once, for compound fracture, and terminated fatally. The patient had led a most intemperate life, and in every respect was an unfavourable subject for any operation. The stump became gangrenous, and the patient died on the sixth day.

Amputation of the Leg.

This operation was performed for injury in seven instances, with two fatal results. A woman, 68 years of age, died from shock a few hours after the operation. In the other fatal case pyæmia was the cause of death, on the twenty-second day.

Amputation of the Foot.

Two cases of Syme's and one of Chopart's. These terminated favourably.

Amputation at the Shoulder-joint.

Five cases—two of them are fully related in another part of this volume by Mr. Lowndes. Of the five cases that were operated on, two terminated fatally; one in forty-eight hours from shock, and the other in eleven days, from secondary hemorrhage and pyæmia.

Amputation through the Upper Arm.

Three cases—one fatal. In the case that terminated fatally, the injury had been caused by a crush beneath some railway waggons, by which the structures on the side and back of the chest had been much bruised. These sloughed extensively, and death was caused by exhaustion on the tenth day.

Amputation through the Fore Arm.

Five cases—all recovered.

Excision of the Knee Joint.

CASE 1.—A man, aged 55, admitted under Mr. Hakes (till lately surgeon to the Hospital), with old standing disease of the knee-joint. The case appeared favourable for excision, which was performed by the semilunar incision. On the sixth day, the patient had several rigors, and died on the seventeenth day with well-marked symptoms of pyæmia.

CASE 2.—A young woman, aged 22, for disease of the knee-joint of five years' standing. On admission, there was very considerable swelling of the joint, but she most complained of fixed and excruciating pain. Mr. Manifold excised the joint on April 25th by the semilunar incision. The case has gone on well. A few sinuses from time to time required opening up, and a portion of carious femur was removed by the gouge. Though the patient has not at present left the hospital, the bones are firmly anchylosed, and her general health is very much improved. The persistence of some discharge from a sinus prevents her at present making use of the limb.

Excision of Elbow-joint.

CASE 1.—The patient, aged 26, had been run over by an engine, and, in addition to other serious injuries, was suffering from a compound fracture of the elbow-joint, and for which excision was performed by Mr. Lowndes. In consequence of the other injuries above alluded to, it was afterwards necessary to amputate the left foot, immediately below the knee, ten days

after he had been in the hospital. He died twenty-four days after the excision of the joint from well-marked symptoms of pyæmia.

CASE 2.—A boy, aged 16, was admitted on January 10, 1867, under Mr. Lowndes, with acute inflammation of the elbow-joint, from an injury received ten days before admission, which, in spite of treatment, resulted in disorganisation of the joint. Excision was performed on March 28th, by the ⊢ incision. The patient did well, and left the hospital with a useful limb.

Lithotomy.

CASE 1.—A boy, aged 4 years. A small mulberry calculus was removed by Mr. Lowndes by the lateral method. The case made a good recovery.

CASE 2.—A boy, aged 12. Mr. Lowndes performed the lateral operation, and removed a mulberry calculus. Recovery.

CASE 3.—A boy, aged 11, admitted under Mr. Harrison. The patient had suffered from symptoms of stone for several years. Four lithic acid calculi, weighing together nearly two ounces, were removed by the lateral method. The mucous membrane of the bladder was very rough, and felt impregnated with calculous deposit. The patient made a good recovery.

CASE 4.—A boy, aged 14 years, admitted under Mr. Lowndes, with symptoms of stone extending over eight or ten years. The lateral operation was performed, and a very large stone was found lodged in, and almost completely blocking up, the neck of the bladder. With much trouble this was removed, and, on examining it, it was at once evident that a portion had been broken off. This was found on introducing the finger again into the bladder, and was readily removed by the forceps. The two portions had been attached by means of a narrow neck. The patient made a good recovery.

CASE 5.—A man, aged 29, was admitted under Mr. Lowndes, suffering from some chronic disease of the bladder. Though he had many of the symptoms of stone, yet none could be detected after the most careful examination. Notwithstanding treatment of every kind, the patient's symptoms increased in severity—

great irritability and pain in passing urine were the most prominent. The bladder was opened by the lateral operation that is adopted in cases of stone. By this means the urine obtained a free escape, and the patient experienced great relief. He, however, gradually became weaker, and died from exhaustion on May 30, nearly two months after the operation. At the *post-mortem* examination, both kidneys were found full of tuberculous matter, and the bladder most remarkably atrophied. For convenience of arrangement, this case has been placed under the heading "Lithotomy."

Operations for Hernia.

CASE 1.—A man, aged 50, was operated on by Mr. Lowndes for strangulated inguinal hernia. The sac was opened. Death occurred in two days from acute peritonitis.

CASE 2.—A man, aged 24, was admitted under the care of Mr. Lowndes, for strangulated inguinal hernia. The sac was opened. On the following day acute peritonitis and pleurisy set in, and he died thirty-six hours after the operation.

CASE 3.—A man, aged 30, was admitted, under Mr. Harrison's care, with strangulated inguinal hernia. The operation was performed about ten hours after symptoms of strangulation set in. The sac was opened. The patient made a good recovery.

ON THE MECHANICAL TREATMENT OF SOME FORMS OF DENTAL IRREGULARITY.

By JOSEPH SNAPE, L.D.S., R.C.S.,

DENTAL SURGEON TO THE ROYAL INFIRMARY, AND LECTURER ON DENTAL SURGERY AT THE SCHOOL OF MEDICINE.

If an irregular position of the teeth be owing to the malformation of either one, or both jaws, little can be done to overcome the deformity with any prospect of success. All such attempts have hitherto proved failures, although every conceivable plan has been tried. Tedious inconvenience, of months' duration, has been borne, in some cases with such exemplary patience, that were it possible, success must have been achieved. This being known, there is little difficulty in deciding whether a case of dental irregularity is, or is not, capable of rectification.

If the deformity be occasioned through the jaws being too small, although otherwise proportionate, the extraction of one or more teeth will often soon reduce the remainder to such a symmetrical condition in the maxillary arch, that their numerical deficiency will seldom be detected, even by a professional eye, without an especial examination.

Our present object is not to treat generally upon dental irregularity, but to show how effectually the simplest contrivances will act upon some forms which require mechanical treatment; thus doing away with the risk of producing as much mischief as that we are trying to remedy, by engendering caries of those teeth the position of which we are endeavouring to change.

For all practical purposes, caries of the teeth may be said to be occasioned by a chemical decomposition of the enamel, which is caused by an acid of some kind or other, which proceeds from either the eructations of a disordered stomach, the secretions of an inflamed mucous membrane, from a vitiated state of the

saliva, or from a more detrimental source than all these combined, viz., the acid formed by the decaying food left upon and between the teeth. Many parents are unaware of the danger arising from this latter cause, and the patients are generally too young and inexperienced to understand, or appreciate, any advice that may be given. As it is evident any mechanical appliance used in cases of irregularity, let the construction be what it may, must necessarily cause an extra accumulation of this alimentary deposit, it becomes the duty of the practitioner to avert these dangers, by having his mechanism as simple, and as free from ligatures as possible, and every facility should be afforded for removing the plates for the purposes of cleanliness.

This plan has been adopted in the treatment of the following cases, with the most gratifying results. We must not omit to mention that, although working as if the whole responsibility rested with us, we endeavoured to impress the minds of both parents and patients, with the paramount importance of preserving the teeth in a healthy condition, by constant cleansing. The following dentrifice was prescribed to cleanse the teeth, and neutralise any acidity.

> Magnes : Carbon : Pond.
> Sodæ : Bicarbon. āā ʒij.
> Creta Precip :
> Pulv. Iridis. Flor : āā ʒss.
> Ott : Rosæ gtt. iij.
> M.

CASE 1.—Is one of the most common forms of dental irregularity. Under this type we sometimes find one, often two, and not unfrequently all four of the upper incisors, upon closing the mouth, shut within those of the under jaw, instead of over them. This abnormal position of one or more of these teeth, when once established, is permanently maintained by mechanical action, as, upon closing the mouth, the pressure of the posterior of the lower incisors upon the anterior surfaces of the upper, must inevitably overcome any natural tendency there might exist, to assume a correct position. Such cases as these are not occasioned by any defect in the size of the jaws, but by the irregular eruption through

the gum of the permanent incisors, the time being normal in one jaw, and abnormal in the other.

In the case before us (Fig. 1.) the incisors of the lower jaw appeared before those of the upper, and took their places a little anterior to those of the temporary, which soon fell out, and as the new teeth increased in length, they advanced, and occupied the places of their predecessors. Whilst this progress was taking place in the lower jaw, the incisors of the upper were at a comparative standstill, so that when they did make their appearance, it was behind those of the temporary, which were not loose, but retained their places. The incisors of the lower jaw, having progressed so far in advance, closed between the temporary and permanent of the upper jaw, thus forcing the latter still further back. Other causes may also operate to produce such deformity, but all are of a strictly mechanical nature, and the treatment adopted to remedy such defects must also be mechanical. In this case constant pressure was exerted upon the irregular teeth, in such a direction, that not only were they prevented from falling into their abnormal position when the mouth closed, but were forced into the direct line of the arch. This may be effected in various ways, and almost all who have written upon the subject give different directions; some, if followed, may be very effectual in reducing the deformity, but, as we have before said, very disastrous in injuring the teeth. In treating the present case, the two temporary teeth were removed, and a cap of gold was made to cover all the lower ones, and adapted to fit with the greatest accuracy. On the superior margin of this plate was soldered a bar, or shield, of the same metal, in the form of an inclined plane, so that the irregular teeth, instead of falling into their unnatural places when closing the mouth, their lingual surfaces fell upon the anterior surface of the inclined plane, and by this means were soon brought into the position represented in Fig. 2, which is drawn from a cast taken when the mouth was fully formed. As no ligatures were required, the plate was easily removed, and as easily cleansed. With a very little tact, the plan of using the inclined plane may be so modified, as to meet almost every case like this.
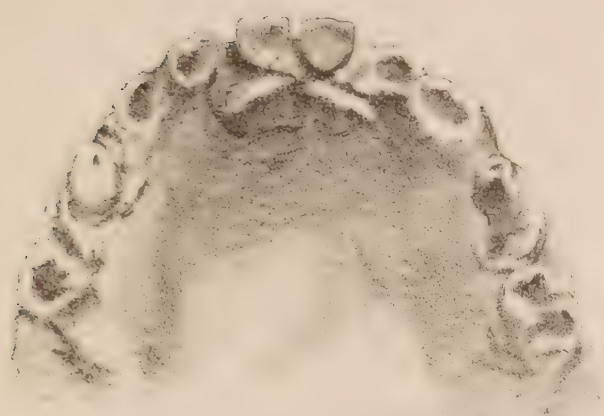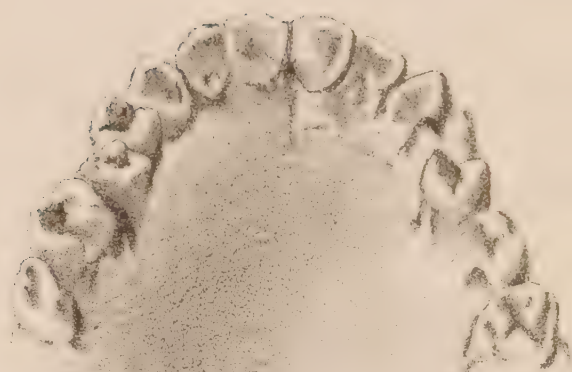
FIG. 1

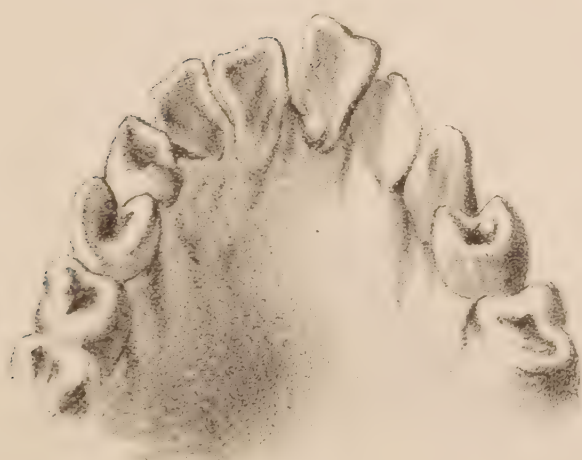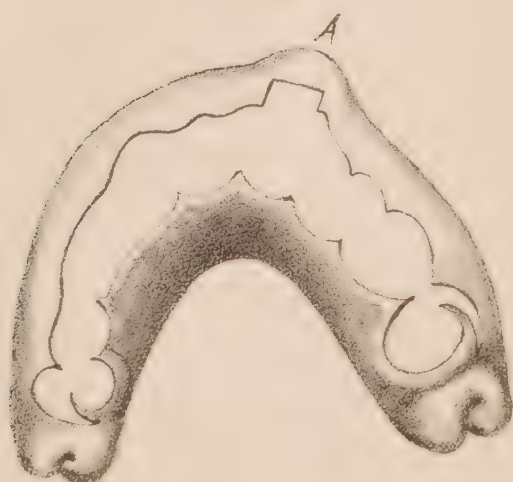FIG. 2

FIG. 3

FIG. 4

FIG. 5

FIG. 6

A

Case 2. Fig. 3 is taken from a cast of the mouth of a young gentleman who was brought to me when between eight and nine years of age. It will be observed here that the lateral incisors are the teeth out of position. They not only close abnormally within, instead of without, the lower incisors, as in the former case, but occupy places posterior to those of the centrals. The following treatment was adopted:—The upper temporary canines were removed, and the lower teeth capped with a plate, as in the former case, armed with a shield, which now, instead of a single, had a double incline, or, in other words, simulated in form the section of a cone. In closing the mouth they were subjected to a double action, and at the same time were moved both in an anterior and lateral direction. In the course of a few months the teeth were brought into the position represented by Fig. 4, from a cast of the mouth taken at the time. It will be understood that during treatment the shield had to be frequently altered in accordance with the changes that were made. When the permanent canines appeared, they presented themselves above the lateral and anterior bicuspid on each side of the mouth. As there was not room for them to arrange themselves symmetrically, the anterior bicuspid on each side was removed. When I last saw my patient, it would not have been suspected that irregularity of any description had ever existed. No injury was sustained by the use of the plates, and the loss of the bicuspids was beneficial in preventing the others from being too crowded.

Case 3. Fig. 5 gives an entirely opposite form of irregularity, which is often very difficult to manage. The patient in this case, a young lady, was brought to me when about the age of nine. The left central incisor projected very much, and overlapped the adjoining tooth; the remainder of the teeth were crowded. The advice given to the parents, much to their disappointment, was to wait until the temporary teeth were all changed, and the mouth more fully formed. Not feeling quite satisfied with this, they consulted another practitioner, and he, more sanguine than myself, commenced the treatment by the action of a spring upon the irregular tooth. Its use was continued for several months,

but was eventually given up as impracticable, on account of the changes effected by constant growth. In the course of a year or two afterwards I was again consulted, and the advice given was the same as before, wait. This they would not do, and another dentist was applied to. He advised the removal of the left anterior bicuspid, and when the space it occupied was closed up by the approximation of the adjoining teeth, without any beneficial result, they came to me again. Our patient was now seventeen, and it was decided to take the case in hand. The parents, who were so anxious for something to be done at a time when it was impossible to operate effectually, now, as if possessed with a spirit of perversity, refused to allow me to do what was absolutely necessary. In the first place they wished to direct as to the time, and now as to the mode, of treatment. This brought us to a stand. I lost patience, and refused to do anything if interfered with. The girl interposed, and told her parents she would submit to any plan I might propose. This confidence on her part gave zest to the interest I had previously taken in the case, and I determined to effect a reduction if practicable. In the first place, the right anterior bicuspid was removed, to gain space, and a plate of gold (Fig. 6) was constructed to pass over both the anterior and posterior surfaces of the upper incisors, extending over the palate. The plate on the labial side, opposite the irregular tooth, was notched (Fig. 6, A), and a portion of its palatal surface, was removed, so as to offer no resistance to its movement. When placed in the mouth, a wedge of compressed hickory wood was inserted into the anterior notch of the plate, which, when wetted with the saliva, became swollen, and so moved the tooth inwards. The plate was removed, the teeth cleaned, and a fresh wedge supplied daily. In the course of a fortnight, which was all the time allowed, I had the satisfaction of seeing the irregularity as nearly reduced as possible, and she left me with her mouth as represented by Fig. 7. A fresh plate, suitable to the altered condition of the mouth, was made to be worn at night, to keep the tooth in situ till quite firm. The parents of this young lady, who for years had been worrying themselves about this deformity,
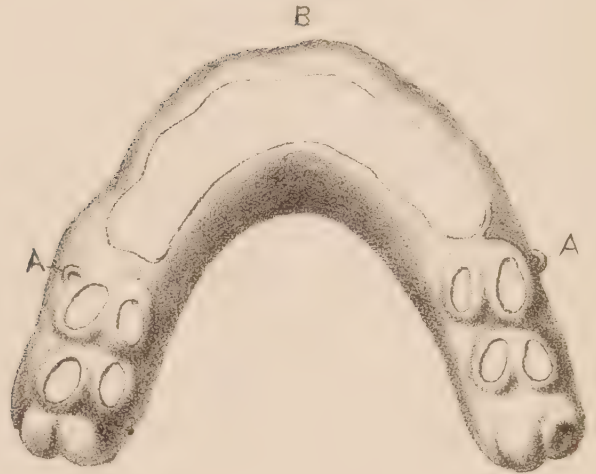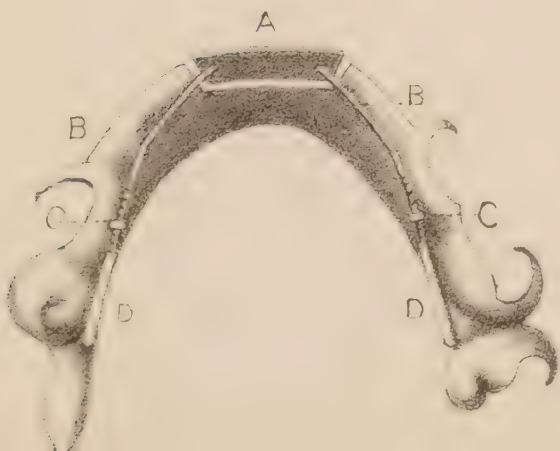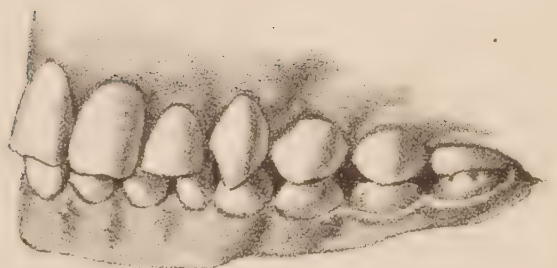
FIG . 7

FIG . 8

FIG . 9

FIG . 10

FIG . 11

and who willingly paid large sums, and allowed their daughter to undergo an untold amount of inconvenience, no sooner saw that it was capable of correction, than they hurried away before the proper treatment was concluded, in order to be present at a ball at Harrogate. I have not seen the patient since, but am informed by her friends that no trace of irregularity can be observed.

CASE 4. Fig. 8 represents an aggravated variety of the last described deformity, and one often met with, but more difficult to correct, on account of the lengthened period required for treatment. The upper incisors assumed a most unsightly projection, and the lower ones a contrary inclination, so that when the mouth was closed, and the molars in contact, there was sufficient space between the upper and lower incisors for the insertion of a finger. This form of irregularity is often brought about by the habit so frequently contracted by children of "sucking the thumb." In the present case I am assured no such habit was formed. When consulted, the patient, a young lady, was between thirteen and fourteen, the temporary teeth were all changed, and the mouth well developed. The treatment adopted was as follows:—A plate (Fig. 9) very similar to that described in the former case was adapted to the upper teeth; that portion which passed over the anterior surface was not so broad, and the palatal surface which surrounded the necks of the central and lateral incisors was cut away, to the extent of about the sixteenth of an inch. On each side of the plate, opposite the anterior bicuspid, was soldered a small gold ring (A A). Through these rings a thin hempen cord used for fish-lines was passed, and tied tightly over the projecting teeth, the anterior bar (B) preventing the cord slipping and injuring the gum. This cord was changed every day, and the treatment soon brought the upper teeth into position. The appearance of the mouth was not so much improved as was anticipated, owing to the contrary inclination of the lower incisors, but how to bring them forward into a more normal position became the question. A variety of contrivances were adopted with very little effect. At last a plan was hit upon which accomplished all we could desire. A gold

plate (Fig. 10) was adapted to fit all over the lingual, and partially over the coronal, surfaces of the lower teeth. A portion of the plate opposite the four incisors, requiring to be moved, was cut away (Fig. 10, A), and attached to two arms or bearers (B B), the ends of which were tapped so as to form screws, and a nut (C C) attached to each. On either side of the plate was placed a socket (D D), in which these arms rested, so that the pressure upon the irregular teeth could be gradually increased by turning the nuts. In less than three months the reduction was complete, and the mouth assumed the more normal appearance represented by Fig. 11. Plates adapted to the altered state of the mouth were worn until the teeth were firm.

The Editors have to announce, with their most sincere regret, the decease of the esteemed and talented author of "Water and its Impurities," which occurred after a few days' illness, as the last sheets of this volume were passing through the press.

ROYAL INFIRMARY

MEDICAL AND SURGICAL PRACTICE.

PHYSICIANS.
Dr. VOSE, Dr. TURNBULL, Dr. INMAN.

CONSULTING SURGEONS.
Mr. JAMES DAWSON, Mr. LONG.

SURGEONS.
Mr. STUBBS, Mr. BICKERSTETH, Mr. HAKES.

HOUSE SURGEONS.
Mr. CHAUNCY PUZEY, Mr. THOMAS BARON.

DENTAL SURGEON.   PATHOLOGIST.
Mr. SNAPE.   Dr. RAWDON.

The Infirmary contains upwards of 250 beds, including the Thornton Wards with 40 beds for the treatment of diseases peculiar to Women.

During the last year (1866) 1201 patients were admitted into the Medical Wards, and 1976 into the Surgical, making a total of 3177 that received treatment as In-patients. In addition to these, 1950 patients suffering from minor injuries were treated as Out-patients, and 391 as Dental patients. These numbers include a large number of children under ten years of age.

The Wards are visited by the Physicians and Surgeons daily, at 12.30 p.m.

CLINICAL LECTURES.—Lectures on Clinical Medicine and Surgery are delivered weekly during both the Winter and Summer Sessions.

SURGICAL OPERATIONS.—The principal Surgical Operations, except in cases of emergency, are performed on Tuesdays, at one p.m. During the last year 331 cases were admitted requiring operation.

DRESSERS AND CLINICAL CLERKS.—Six Dressers and Six Clinical Clerks are elected quarterly from the Students attending the practice of the Infirmary.

PRACTICAL PHARMACY.—Students are admitted to learn Pharmacy in the Dispensing Department.

POST-MORTEM EXAMINATIONS are made, and instruction in Morbid Anatomy is given by Dr. RAWDON. Two Post-mortem Clerks are appointed by Dr. RAWDON for periods of six months, to assist in the conduct of these examinations.

INSTRUCTION IN DENTISTRY.—Mr. SNAPE attends at the Infirmary every Tuesday and Friday, at nine a.m., and gives instruction in Dental practice.

CLINICAL PRIZE.—The Surgeons of the Infirmary will award, in May, 1868, a prize of the value of £5, for the best report of Surgical cases occurring in the Infirmary.

FEES FOR HOSPITAL PRACTICE AND CLINICAL LECTURES.

	Medical.	Surgical.
Six Months	£5 5 0	£5 5 0
One year	9 9 0	9 9 0
Second Year	6 6 0	6 6 0
Third Year	5 5 0	5 5 0
Perpetual	18 7 6	18 7 6

Students are admitted to the practice of the Lock Hospital attached to the Infirmary.

FEE......£3 3 0 PER ANNUM, £2 2 0 SIX MONTHS.

Four Apprentices are admitted to reside and board in the house for £60 guineas per annum, and for one, two, or three years, upon payment of 70, 130, or 190 guineas. These sums include Library and Lecture fees, but not Hospital practice.

Cards of attendance upon the practice and Clinical Lectures of the Royal Infirmary may be obtained on application to the House Surgeon.

SCHOOL OF MEDICINE,

(ADJOINING THE INFIRMARY.)

LECTURES—WINTER SESSION.

CLASSES.	LECTURERS.	DAYS AND HOURS OF LECTURES.	FEE FOR COURSE.
Principles and Practice of Medicine	J. CAMERON, M.D., M.R.C.P., Physician to the Southern Hospital...........................	Monday, Tuesday, Thursday, and Friday, at 5 p.m.	£4 4 0
Principles and Practice of Surgery...............	Mr. BICKERSTETH, F.R.C.S., Edin., Surgeon to the Royal Infirmary	Tuesday, Thursday, and Friday, at 6.30 p.m.	4 4 0
Physiology and General Anatomy	A. T. H. WATERS, M.D., F.R.C.P., Physician to the Northern Hospital............	Monday, Wednesday, and Friday, at 9.15 a.m.	4 4 0
Descriptive and Surgical Anatomy.............	Mr. REGINALD HARRISON, F.R.C.S., Eng., Surgeon to the Northern Hospital......	Tuesday, Thursday, and Saturday, at 9.15 am. and Monday, at 3 p.m.	4 4 0
Demonstrators of Anatomy	F. T. ROBERTS, M.B., Lond., T. R. GLYNN, M.B., Lond.,		
Chemistry and Experimental Philosophy...	E. H. BIRKENHEAD, D.Sc., Lond.	Monday, Wednesday and Friday, at 10.15 a.m.	5 5 0

LECTURES—SUMMER SESSION.

Midwifery and Diseases of Women...............	Mr. STEELE, M.R.C.S., Surgeon to the Ladies' Charity	Monday, Wednesday, and Friday, at 3 p.m.	£4 4 0
Diseases of Children ...	R. GEE, M.D., M.R.C.P., Physician to the Liverpool Workhouse and Fever Hospital	Wednesday and Saturday, at 9 a.m............	
Materia Medica and Therapeutics	J. BIRKBECK NEVINS, M.D., Lond.	Daily, at 8 a.m............	4 4 0
Medical Jurisprudence ...	E. WHITTLE, M.D., Lond., M.R.I.A.	Monday, Wednesday, and Friday, at 4 p.m.	3 3 0
Toxicology	E. H. BIRKENHEAD, D.Sc., Lond.		
Botany	F. T. ROBERTS, M.B., B.Sc., Lond., Physician to the Northern Hospital	Tuesday, Thursday and Friday, at 9.15 a.m....	3 3 0
Ophthalmic Medicine and Surgery............	R. HIBBERT TAYLOR, M.D., Senior Surgeon to the Eye and Ear Infirmary	Tuesday and Friday, at 2 p.m.....................	2 2 0
Practical Chemistry ...	E. H. BIRKENHEAD, D.Sc., Lond.	Monday and Thursday, at 10.15 a.m.	3 3 0
Pathological Anatomy	H. G. RAWDON, M.D., Pathologist, Royal Infirmary	Wednesday and Saturday, at 10 a.m.	2 2 0
Comparative Anatomy and Zoology	A. DAVIDSON, M.A., M.B., Edin.	Twice a week...............	2 2 0

LECTURES FOR DENTAL DIPLOMAS.

Dental Surgery	Mr. SNAPE, L.D.S., R.C.S......	Tuesday, at 9 a.m.	£1	1	0
Dental Mechanics		Friday, at 9 a.m.	1	1	0
Dental Anatomy and Physiology, Compara- tive and Human	Dr. DAVIDSON		2	2	0
Metallurgy	Dr. BIRKENHEAD.........		1	1	0

COMPOSITION FEE.

A composition fee of forty guineas will entitle the Student to all the Lectures required for the Membership of the Royal Colleges of Surgeons, and the Licences of the College of Physicians and the Apothecaries' Company.

PRACTICAL ANATOMY.

Demonstrators of Anatomy { F. T. ROBERTS, M.B., B.Sc., Lond., T. R. GLYNN, M.B., Lond.

This department is under the immediate superintendence of the Lecturer and Demonstrators of Anatomy. The Dissecting Room is open daily, from nine a.m. to five p.m., except Saturday, when it is closed at two p.m. Ample opportunities are afforded for dissecting, at a moderate expense.

The Demonstrators of Anatomy are in attendance daily to direct the students in their studies, and examinations are frequently held upon the dissections in the room. Microscopical demonstrations will also be given from time to time.

The Dissecting Room is open to Students who have entered to the Anatomical or Physiological Lectures; students who have not entered to either of these classes will be required to pay a fee of £2 2s. Subjects may be provided during the summer session.

OPERATIVE SURGERY.

Opportunities will be afforded of performing operations on the dead subject under the superintendence of Mr. HARRISON. Fee for the course, with use of instruments, £2 2s.

MUSEUM.

Honorary Curator :—Mr. JOHN H. EVANS, M.R.C.S.

The Museum is open daily to the Students. In addition to con- taining a large number of specimens of Morbid and Comparative

Anatomy (which have recently been catalogued), there is an excellent collection of Wax Models, illustrating some of the principal dissections of the Human Body—the Anatomy of the Eye, the Internal Ear, and other subjects connected with Medicine, Surgery, and Midwifery. These have been recently presented to the School by Mr. BICKERSTETH, and will afford additional facilities to the Students for the acquirement of knowledge. There is also a collection of Materia Medica, arranged for the use of Students.

LIBRARY AND READING ROOM.

The Library contains a good selection of the most modern works, and is open to the Students, on the payment of 10s. 6d. annually, or £1 1s. perpetual.

PRACTICAL MIDWIFERY.

Students attending the Lectures on Midwifery will have cases assigned to them, under the superintendence of the Lecturer.

VACCINATION.

The course of practical instruction and certificate of proficiency, which is now a necessary qualification for the appointment of public or Parochial Vaccinator, and which can only be obtained from a teacher of Vaccination recognised by the Privy Council, may be procured on application to the Lecturer on Midwifery. The Fee is £1 1s.

MICROSCOPICAL DEMONSTRATIONS.

Demonstrations on the use of the Microscope in the examination of Morbid Products will be given by Dr. RAWDON during the Summer Session, on Saturdays, at ten a.m. These are open to the Students without fee.

CHEMISTRY AND PRACTICAL CHEMISTRY.
Lecturer—Dr. E. H. BIRKENHEAD.

The course of Lectures on Chemistry commences with an outline of the chief branches of Natural Philosophy. This is followed by a complete course on Inorganic and Organic Chemistry, in which all the important facts and principles are reviewed, and illustrated by numerous experiments. The system of Chemical Notation and Nomenclature adopted in the Lectures is in accordance with the most approved modern theories. There is a well-furnished Laboratory attached to the School. In the Summer Course of Practical Chemistry, each Student works

independently, and can, if necessary, pursue a special line of study. The general course includes the examination and detection of all the commonly occurring Bases, Acids, and Salts; the characters of Mineral and Organic Poisons; the nature and detection of the components of Healthy and Morbid Urine; the Microscopical and Chemical Examination of Urinary Deposits and Calculi; and the study of Blood, Milk, and other Organic Products.

Dr. BIRKENHEAD also receives pupils in his Laboratory for private instruction in Chemistry and other branches of science.

EXHIBITIONS AND PRIZES,

The following Exhibitions are open to the Student.

ROYAL INFIRMARY MEDICAL SCHOLARSHIP—value £42—consisting of a Gold Medal, value £10 10s., and Six Months' free Board and Residence, with Dressership and Clerkship in the Royal Infirmary. In case the Scholarship is gained by a resident Pupil, Six Months' payment (£31 10s.) will be returned to him.

FOUR EXHIBITIONS—value £31 10s. each—consisting of free Board and Residence in the Royal Infirmary for Six Months, with Dressership on award of the Medical Board.

The Examination for the Scholarship is held in the month of August.

The Examinations for the Exhibitions are held in the months of April and October, and on each occasion two are open for competition. The subjects of examination are announced six months previously.

The successful candidates reside in the Infirmary, free of expense, for a period of six months, and thus have the fullest opportunities of obtaining practical knowledge.

At the termination of the Winter and Summer Sessions, Examinations are held for Silver Medals, Book Prizes, and Certificates of Honor in the various classes.

DIPLOMAS AND DEGREES.

The Lectures and Hospital practice qualify for examination at the Royal Colleges of Physicians and Surgeons, the University of London, Apothecaries' Hall, the Army, Navy, India, and other Examining Boards.

The Lectures in Chemistry, Botany, and Comparative Anatomy are available for Students preparing for the various degrees in science at the University of London.

The Lectures on Comparative Anatomy will be illustrated by prepations and recent dissections.

FELLOWSHIP OF THE ROYAL COLLEGE OF SURGEONS.

By the recent regulation of the Royal College of Surgeons, residence in London is no longer required from those who purpose presenting themselves for this diploma by examination. The following course of Lectures must be taken out in addition to those required for the Membership.

a.—A third Winter Session's attendance on Anatomy and Physiology with dissections.

b.—A course of Lectures on Comparative Anatomy.

c.—A course of Instruction in Operative Surgery.

EXAMINATIONS, &c.

Examinations are frequently held by the Lecturers on the special subjects of the course.

Students of the first year are examined weekly by the Demonstrator of Anatomy; Students preparing for the Primary and Pass Examinations at the Royal College of Surgeons, are examined weekly by the Lecturer and Demonstrators of Anatomy.

Classes will be specially arranged for students preparing for the University of London.

REGISTRATION, REGULATIONS, &c.

Tickets for the Lectures are to be obtained from the Registrar, and countersigned by the respective Lecturers.

By order of the Medical Council, Students are required to be registered within fifteen days after the commencement of the Session.

The Winter Session commences on October 1st, and terminates March 31st. There is a short vacation at Christmas.

The Summer Session commences on May 1st, and terminates July 31st,

Every Student on entering is required to sign an obligation of conformity to the Rules and Regulations of the School.

Schedules will only be signed and Certificates given where the attendance of the Student has been satisfactory to the Lecturer, and the School will not be responsible for the return of fees forfeited by the irregularity of a Student.

The attendance on Lectures of all Students is registered.

Students can reside with some of the Lecturers.

Students are recommended to take out the classes in the following order :—

First Winter Session.

Anatomy,   Physiology,   Chemistry.

First Summer Session.

Materia Medica,   Botany,   Practical Chemistry.

Second Winter Session.

Anatomy,   Physiology,   Medicine,   Surgery.

Second Summer Session.

Midwifery and Diseases of Women and Children.
Medical Jurisprudence.

Third Winter Session.

Medicine,   Surgery.

The extra classes can be taken out to suit special requirements at the option of the Student.

PRELIMINARY EDUCATION.—By an order of the Medical Council of England, no Student commencing professional studies at a Medical School can be registered who has not passed an examination in Arts.

Further information may be obtained from the Registrar, Mr. REGINALD HARRISON, 18, Maryland Street, to whom all communications are to be addressed.

THE

LIVERPOOL

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EDITED BY

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AND

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